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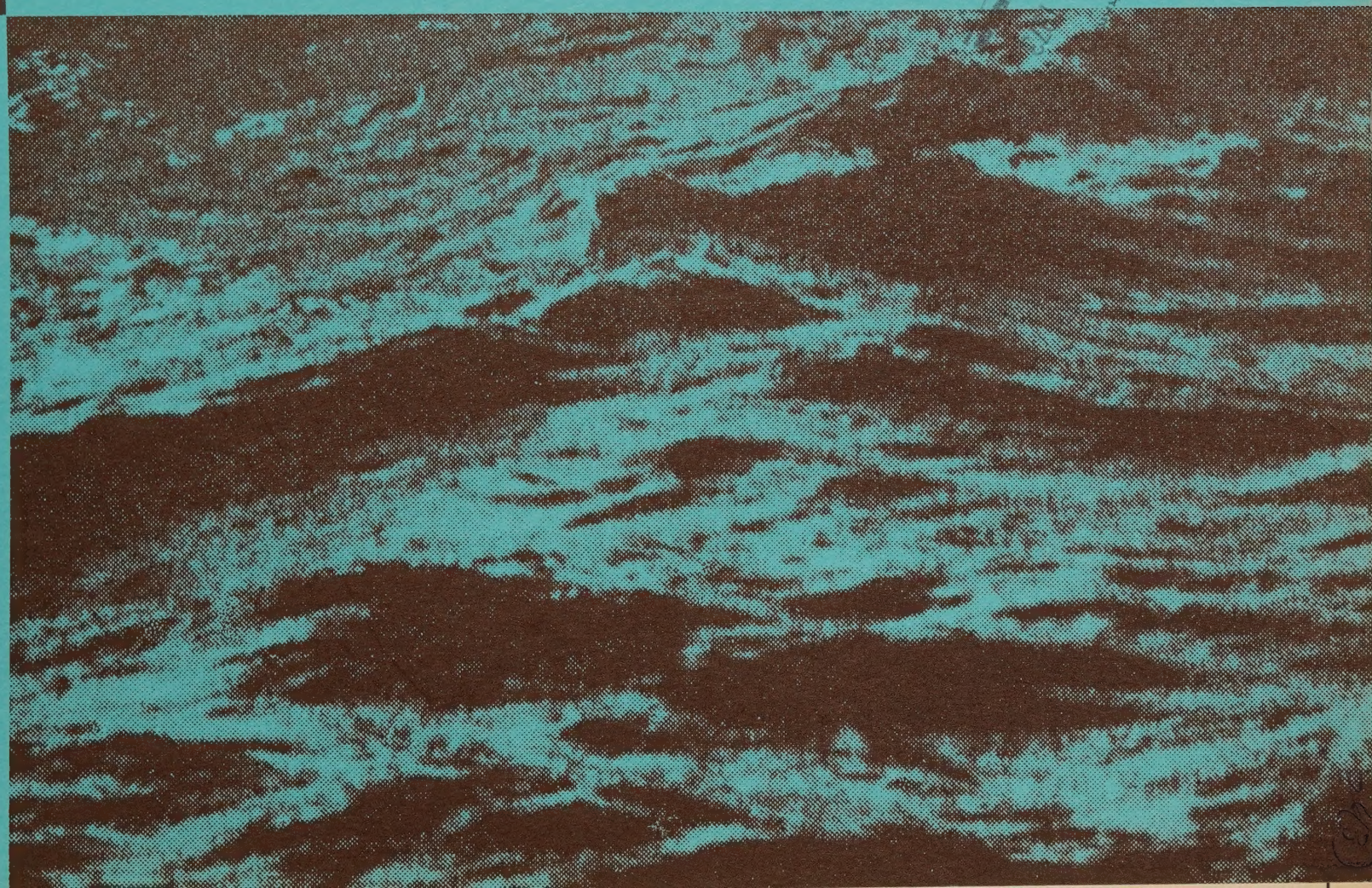

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

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0.322 (1.89) SPAWNING INHIBITOR IN GONADS OF THE STARFISH, ASTERINA PECTINIFERA

Ikegami, Susumu, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 11, 1899-1902 (Nov. 1972)

The gonad of the starfish is induced to shed mature gemetes (reproductive cells--eggs) by the gonad stimulating substance (GSS) 1-methyladenine secreted by nerve tissue. The gonad, however, fails to react to the GSS at the earlier stage of the breeding season and becomes more sensitive to it toward the end of the season. The agent that controls spawning by inhibiting nerve tissue secretions was found to be L-glutamic acid.

Samples of separated ovaries and testes were homogenized in sea water, and the active agent was purified by centrifugation, extraction with sodium chloride, gel filtration, and chromatography techniques. The purified extract thus obtained was identified as L-glutamic acid by thin-layer and paper chromatography, paper electrophoresis, and amino-acid analysis. Other experiments showed that this spawning inhibitor contained in ovary extract was similar or identical to that extracted from testes.

Authentic L-glutamic acid had the same spawning inhibiting effect on nerve tissue as the purified extract. Other amino acids tested had no such activity except L-aspartic acid which was much less active (less than 10% of L-glutamic acid). [4 figures, 1 table, 9 references] SW

0.322 (1.89) ISOLATION AND CHARACTERIZATION OF SPAWNING INHIBITORS IN OVARY OF THE STARFISH, ASTERIAS AMURENSIS

Ikegami, Susumu, Yuji Kamiya, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 11, 2005-2011 (Nov. 1972)

In another report in the same journal number, the authors isolated and identified the inhibitor of spawning in another starfish, Asterina pectinifera, to be L-glutamic acid. This acid, however, is specific to A. pectinifera, having no inhibitory effect on the spawning of A. amurensis.

To isolate and identify the spawning inhibitor of this starfish the ovaries were homogenized in sea water and centrifuged at 30,000×g at 2° C. for 50 min. The supernatant was diluted with sea water containing nerve tissue. Into each solution was placed a fragment of ovary removed from the starfish at the peak of the breeding season; and the degree of spawning was observed.

The effect of the homogenized, centrifuged ovary isolate was to counteract the activity of the gonad-stimulating substance (GSS) contained in the nerve tisuse. Starfish testes prepared similarly also inhibited GSS.

The isolate was purified by extraction, gel filtration, and silica-gel column chromatography. Two fractions were detected and isolated. Assay of both for activity as inhibitors against 10 µg. of nerve tissue Fraction A showed inhibition of GSS at 12.5 to 125 µg. per milliliter and Fraction B 63 to 125 µg. per ml. Both fractions caused hemolysis and easily foamed in water. Spectrophotometric and chromatography analysis of Fraction A after hydrolysis showed characteristics of

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0.35 (9.12) THE FREEZING RESISTANCE OF ANTARCTIC FISH: I. SERUM COMPOSITION AND ITS RELATION TO FREEZING RESISTANCE

Smith, R. N.
British Antarctic Survey Bulletin, No. 28, 1-10 (June 1972) (British Antarctic Survey, Natural Environment Research Council, 30 Gillingham St., London SW1V 1HY, England) Price £1.50 net.

In polar regions, the blood of teleost fish may be supercooled for all or part of the year, and while supercooled, the fish may be in danger of freezing if the freezing is initiated ("seeded") by contact with ice. These fish, in order to survive, must either avoid contact with ice or must be able to resist formation of ice in their bodies if contact with ice does occur. Deep-water species of Arctic fish avoid contact with ice and the shallow-water Arctic species possess a marked freezing resistance. In the present study, the serum from nine species of Antarctic fish was analyzed to determine which components, if any, aid their survival in the polar region; the serum from two subtropical fish was examined for comparative purposes. The polar species were caught off Signy Island, Borge Bay and South Georgia, King Edward Point and Prince Olav Harbor and consisted of the following species Notothenia neglecta Nybelin, N. rossii marmorata Fischer, N. gibberifrons Lönnberg, Chaenocephalus aceratus (Lönnberg), Parachaenichthys charcoti (Vaillant), Trematomus bernacchii Boulenger, and T. newnesi Boulenger, and Muraenolepsis microps Lönnberg. The subtropical species were caught off Montevideo and consisted of Micropogon furnieri (Desmarest) and Netuma barbus (Lacépede). Blood samples were obtained from the heart of the fish. The serum

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0.35 (9.12) THE FREEZING RESISTANCE OF ANTARCTIC FISH: II. THE FREEZING POINTS OF BODY FLUIDS

Smith, R. N.
British Antarctic Survey Bulletin, No. 29, 91-102 (Aug. 1972) (British Antarctic Survey, Natural Environment Research Council, 30 Gillingham St., London SW1V 1HY, England) Price £1.50.

The freezing points of the body fluid of polar fish (in conjunction with body temperatures) indicate whether or not the fish are supercooled when they encounter low sea temperatures. Freezing-point measurements along with chemical analyses data reveal the response of the polar fish to change of temperature (whether changes in salt concentration occur or whether specific "antifreeze" substances are released in the body fluids). The present paper, reports the freezing points of the body fluids of nine teleosts from the Antarctic. The first part of the article consists of a critical review of methods for measuring freezing points with especial reference to their application to biological fluids. A modified version of the J. A. Ramsay and R. H. J. Brown [J. Scient. Instrum. 32, No. 10, 372-375 (1955)] freezing point method was used. By this method, freezing points of small samples (4×10^{-2} mm^3.) can be measured to ±0.02° C. The fish were caught off Signy Island in the South Orkney Islands and at South Georgia. The freezing points of the serum, aqueous humor, urine, cerebrospinal fluid, bile, and tissue fluid were measured.

The freezing points of the various fluids of the nine Antarctic teleosts were between -0.65° C. and -1.34° C. There were no marked differences between the

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asterosaponin A, previously reported from the same starfish. Fraction B was similarly analyzed and found to be asterosaponin B. Biological activity of these fractions compared to authentic asterosaponins and was found to be identical.
[5 figures, 17 references] SW

0.35 ISOLATION OF RIBONUCLEIC ACID

Ueno, Kisaburo, Saburo Adachi, Toyoasu Koda, and Tamotsu Minami (Mitsui Toatsu Chemicals Co., Ltd.) (pat.)
Japanese Patent 21997/72 (June 20, 1972)
Chemical Abstracts 77, No. 13, 86664u (Sept. 25, 1972)

0.35 (9.12)

freezing points of the various body fluids in the same fish. The measured freezing points agreed reasonably well with the calculated values. The aqueous humor and urine were, on the average, hypoosmotic to serum for all fish, but the bile (of all species except Notothenia neglecta), cerebrospinal fluid, and tissue fluid were hyperosmotic to serum. The author concludes from the results that the polar fish are supercooled at low environmental temperatures.
[1 figure, 3 tables, 68 references] FTP

0.35 ISOLATION AND STRUCTURE OF A NEW STEROID, ASTEROSAPOGENINE I, FROM ASTEROSAPONINS A AND B (8.59)

Ikegami, Susumu, Yuji Kamiya, and Saburo Tamura (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 10, 1777-1782 (Oct. 1972)

Starfish contain toxic saponins (glucosides). Earlier, T. Yasumoto, T. Watanabe, and Y. Hashimoto [Bull. Jap. Soc. Sci. Fisheries 30, 357 (1964)] isolated six saponins from the starfish Asterias amurensis, naming the two major ones asterosaponins A and B. In the present study, the authors subjected asterosaponins A and B to acid hydrolysis, and isolated a new steroid, which was the main component of the hydrolyzed mixture. The new steroid was named asterosapogenine I and was assigned the structure 3β,6α-dihydroxy-5α-pregn-9(11)-en-20-one. FTP
[5 figures, 1 table, 9 references]

0.35 (0.4) PANCREATECTOMY IN THE EEL: EFFECTS ON SERUM GLUCOSE AND CHOLESTEROL

Lewis, Thomas L., and August Epple (Daniel Baugh Institute of Anatomy, Jefferson Medical College of Thomas Jefferson University, Philadelphia, PA 19107)
Science 178, No. 4067, 1286-1288 (Dec. 22, 1972)

Little is understood about the physiological role of the endrocrine pancreas in fishes; furthermore, the few data on pancreatectomy or isletectomy in teleosts are in part contradictory. The American eel is the only teleost known to have all islet tissue concentrated in a compact pancreas. The researchers examined the effects of pancreatectomy of the American eel on (1) serum glucose, as an indicator of diabetic alterations; and (2) serum cholesterol, because of its high levels in some teleosts (particularly the eel).

Pancreatectomy in the American eel caused a slight tendency toward hypoglycemia. Total and partial pancreatectomies caused a drop of total serum cholesterol. The total serum cholesterol of the eel is comprised of two fractions, one of which is pancrease dependent (this fraction amounts to about 70 to 80%). The complete removal of the islet tissue in the eel, thus, is not followed by diabetes mellitus; furthermore, the endocrine control of the cholesterol-containing serum seems to differ from that in mammals.
[2 figures, 42 references] FTP

0.35 (9.12)

was separated from the clotted blood and was stored deep frozen until analyzed. The freezing points of the serum were determined. Chemical analyses for sodium, potassium, protein, total carbohydrate, and reducing sugar were made.

The serum from the Antarctic fish was a more concentrated solution than was the serum from the temperate fish. Unusually high levels of serum reducing sugar occurred in most of the Antarctic species.

Two of the Antarctic species of fish were caught in the summer and in the winter. The concentration of most serum constituents was higher in the winter-caught fish than in the summer-caught fish; however, the higher level of constituents was not sufficient to lower the serum freezing point to that of sea water. It appears that inorganic serum constituents do not contribute significantly to the freezing resistance of supercooled fish in contact with ice. Serum reducing sugar and possibly protein and glycoprotein appear to protect the blood from freezing, probably by preventing or retarding the nucleation and propagation of ice in the blood. When a comparison was made of the serum composition and freezing resistance of several species, it was apparent that knowledge of serum composition alone was insufficient to predict the survival time of a supercooled fish in contact with ice; however, the comparison was sufficient to predict whether or not the blood of the fish was liable to freeze in these circumstances.
[8 tables, 52 references] FTP

0.35 DIFFERENCES IN TRIACYLGLYCEROLS FROM ACOUSTIC TISSUES AND POSTERIOR CRANIAL BLUBBER OF THE NARWHAL (MONODON MONOCEROS)

Robisch, Paul A., Donald C. Malins (Pioneer Research Unit, Northwest Fisheries Center, Seattle, WA 98102), Robin Best (Dept. of Zoology, University of British Columbia, Vancouver, British Columbia, Canada), and Usha Varanasi
Biochemical Journal 130, No. 1, 33P-34P (Nov. 1972)

This article summarizes a paper presented at the 529th Meeting of the Biochemical Society held at the University of Cambridge, England, on July 4-5, 1972.

The acoustic tissues of porpoises (Phocoena phocoena and Tursiops gilli) and the Beluga whale (Delphinapterus leucas) contain large amounts of isovalerate (3-methylbutyrate) and long-chain saturated iso acids. The cranial blubber (which has no acoustic function) of T. gilli contains primarily acids characteristic of normal mammalian adipose tissues. The large amounts of di-isovaleroyl glycerides in the acoustic tissues of T. gilli appear to play a vital role in sound transmission. In the present study, analyses were performed on the triacylglycerols from the acoustic tissues at the attachment point of the mandibular waveguide to the bulla in the Arctic narwhal (Monodon monoceros). For comparative purposes, analysis was also made of the triacylglycerols from the nonacoustic posterior cranial blubber.

The acoustic tissues and the blubber contained 94.5% of lipid, consisting of 82.2% and 85.5% of triacylglycerols, respectively. The triacylglycerols from the acoustic tissues contained 47.8 mol of isovalerate per 100 mol and 18.7 mol of long-chain iso acids (primarily isopentadecanoate) per 100 mol. Straight-chain monounsaturated acids ($C_{16:1}$; $C_{18:1}$) were found in significant amounts, and some

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0.38 CATHEPTIC ACTIVITY OF FISH MUSCLE

Reddi, Penchala K., Spiros M. Constantinides, and Henry A. Dymsza (Dept. of Food and Nutritional Science, University of Rhode Island, Kingston, RI 02881)
Journal of Food Science 37, No. 5, 643-648 (Sept.-Oct. 1972)

Fish muscle cathepsins have not been studied in great detail, although some work has been done on the purification and activity of these cathepsins. [Cathepsins are enzymes in living cells that have a hydrolytic action in living or dead animal tissues.]

In the present study, the authors examined the intracellular localization of catheptic activity in the skeletal muscle of winter flounder and determined some of the physical and chemical properties of the enzyme in its relation to autolytic spoilage.

The catheptic activity was localized in the lysosomal fraction of the skeletal muscle of the fish. The muscle cathepsin acted on urea-denatured hemoglobin, native hemoglobin, globin, bovine serum albumin, and on certain cytoplasmic proteins (endogenous). The optimum hemoglobin splitting activity of the enzyme was at pH 4.0. The enzyme is thermostable, dialysis has no effect on its activity, and it is inhibited by sodium chloride, cysteine, ATP, NAD, and pheynl methyl sulfonyl fluoride. The molecular weight of the enzyme is about 32,000.
[7 figures, 4 tables, 34 references] FTP

0.35 BINDING TO MITOCHONDRIAL PROTEINS OF LECITHINS CONTAINING KNOWN FATTY ACIDS

Collins, F. D., G. G. De Pury, Maria Havlicek, and Chor-Sang Lim (Russell Grimwade School of Biochemistry, University of Melbourne, Parkville, Victoria 3052, Australia)
Chemistry and Physics of Lipids 7, No. 3, 144-158 (Nov. 1971)

Mitochondria, freed of lipids by aqueous acetone extraction, rebind lecithin in a two-step reaction in which the second step is rate limiting. This binding occurs faster in lecithins from rats deficient in essential fatty acids than in lecithins from normal rats. In lecithins of rats deficient in essential fatty acids, the linoleic and arachidonic acids of the lecithins of the normal rats are replaced by palmitic, oleic, and 5,8,11-eicosatrienoic acids. This paper reports on the mechanism and relative importance of these changes in fatty acid composition in influencing the rate of binding of lecithin to mitochondrial protein.

The lecithins from the livers of normal rats and from rats deficient in essential fatty acids were separated into fractions containing mainly 1,2,3, or 4 double bonds. These fractions were then dispersed in aqueous buffer (10 mM tris chloride, pH 7.6) by ultrasonic irradiation. The rates of binding of the lecithin dispersions to mitochondria (whose lipids had been extracted with aqueous acetone) were measured.

The kinetics of the reaction involved initially a Brownian coagulation between lecithin and protein particles followed by a rate-limiting interaction of lecithin molecules with mitochondrial protein. The authors derived a rate equation

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0.4 (0.6) CONTRIBUTIONS OF THE BIOLOGICAL SCIENCES TO HUMAN WELFARE

[various authors as listed below]
Federation Proceedings 31, No. 6, Part II, TF5-TF144 (Nov.-Dec. 1972)

Reviews are made of the contributions of biological research to the betterment of human welfare. The subjects and areas considered are:

"Introduction," by Edwin H. Lennette and J. F. A. McManus, pp. 13-17;
"Basic Biomedicine," by James W. Colbert, Jr., pp. 19-32 [4 tables, 11 references];
"Clinical Medicine," by George E. Burch, pp. 33-70 [14 figures, 1 table, 55 references];
"Dental Science," by Joseph F. Volker, pp. 71-79 [2 figures, 23 references];
"Food," by Emil M. Mrak, pp. 81-90 [16 references];
"Population Biology," by Frederik B. Bang, pp. 91-100 [23 references];
"Environmental Hazards," by John J. Hanlon, pp. 101-120 [4 tables, 65 references];
"Marine Sciences," by Clarence P. Idyll, pp. 121-130 [7 references]; and
"Natural Resources," by Frederick Sargent II, pp. 131-139 [7 references].
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for these two steps that contained three parameters representing, respectively, the rate constant for the coagulation step, the surface area of the mitochondria, and the rate constant of the second step. Lecithins containing arachidonic acid (that is, the lecithins from livers of normal rats) interacted significantly more slowly than those containing 5,8,11-eicosatrienoic acid or mixtures of oleic and linoleic acids. The slow binding of arachidonyl lecithins suggests that these species are bound to mitochondrial membrane protein more strongly than are 5,8,11-eicosatrienoyl or oleyl lecithins. Apparently an important role of the essential fatty acids is to stabilize lipoprotein membranes; in a deficiency of the essential fatty acids, linoleic and arachidonic acids are replaced by oleic and 5,8,11-eicosatrienoic acids with a resulting weakening of phospholipid protein bonds.
[3 figures, 7 tables, 22 references]

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polyunsaturated acids ($C_{16:2}$; $C_{16:3}$) were detected. The triacylglycerols from the blubber had 4.2 mol of isovalerate per 100 mol and 0.9 mol of long-chain iso acids per 100 mol, with large amounts of straight-chain monounsaturated acids ($C_{14:1}$; $C_{16:1}$; $C_{18:1}$; $C_{20:1}$; $C_{22:1}$) and polyunsaturated acids ($C_{18:2}$; $C_{20:5}$; $C_{22:5}$; $C_{22:6}$). Sixty-six percent of the structures of the triacylglycerols from the acoustic tissues consisted of 2 mol of isovalerate and 1 mol of long-chain acid per mol. The blubber did not contain di-isovaleroyl glycerides. The present findings strengthen the hypothesis that di-isovaleroyl glycerides are involved in the biosonar of marine cetaceans. Also, the lipid structural requirements for acoustic tissues appear to be similar for marine cetaceans from warm and from cold waters.
[5 references]

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0.35 PRODUCING COLLAGENASE BY CULTURING A VIBRIO SPECIES
(0.5)

Merkel, Joseph R. (Lehigh University) (pat.)
U.S. Patent 3,677,900 (July 18, 1972)
Chemical Abstracts 77, No. 13, 86663t (Sept. 25, 1972)

0.5 NITROSAMINES AND THE INHIBITION OF CLOSTRIDIA IN MEDIUM HEATED WITH SODIUM NITRITE

Wasserman, Aaron E., and Charles N. Huhtanen (U.S. Dept. of Agriculture, Eastern Regional Research Laboratory, Eastern Marketing and Nutrition Research Div., ARS, Philadelphia, PA 19118)
Journal of Food Science 37, No. 5, 785-786 (Sept.-Oct. 1972)

Earlier (1967 and 1968) work demonstrated the formation of an inhibitor for the growth of several species of Clostridium during the heat sterilization of a culture medium containing $NaNO_2$. It appeared that the nitrite reacted with a component of the medium and that the inhibitory material was something other than nitrite. The nature of the inhibitory component is not known. In the present study, the researchers attempted to determine whether nitrosamines were responsible for the inhibition of the clostridia. The culture medium was prepared in two ways. In the first method, the $NaNO_2$ was added to the medium and the medium was autoclaved. In the second method, the medium and the NO_2^- solution were autoclaved separately, then mixed aseptically. Sodium nitrite was used in the media at levels ranging from 640 to 1.25 p.p.m. The test organism was C. botulinum B1218 (USDA culture).

In the medium autoclaved with the NO_2^-, the minimum inhibitory level of NO_2^- was 40 p.p.m.; in the medium to which NO_2^- was added aseptically, the minimum inhibitory level of NO_2^- was 640 p.p.m. Analysis of the medium prepared with 640 p.p.m. of sodium nitrite revealed no nitrosamines. Additional experiments were carried out using the nitrosamines N-nitrosodimethylamine, N-nitrosodiethylamine, N-nitrosoproline, N-nitrosomorpholine, N-methyl-N-nitrosoethylamine, N-nitrosodiethanolamine, 1-nitrosopiperidine, N-nitrosodiphenylamine, N-methyl-N-nitrosoaniline, and N-nitrosomethylurea. None of these nitrosamines inhibited the growth of C. botulinum, even up to levels of 1,000 p.p.m. [1 figure, 6 references]

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0.38 (3.15) THE EFFECT OF GAMMA IRRADIATION ON THE ANTITHIAMINE ACTIVITY OF SKIPJACK TUNA

Hilker, Doris M., Nora Yu-Ang Tang, and King-Cham Chan (Dept. of Food and Nutritional Sciences, University of Hawaii, Honolulu, HA 96822)
Journal of Food Science 37, No. 4, 596-598 (July-Aug. 1972)

Earlier work at the authors' laboratory demonstrated that skipjack tuna contain antithiamine activity which is nonenzymatic. The activity resides in a protein-nonprotein complex, with the nonprotein moiety being responsible for the antithiamine activity. Other workers isolated a thermostable antithiamine factor (a hemin or a related compound) from carp viscera. Heme proteins, including hemoglobin and catalase, show antithiamine activity. Recent reports indicate that irradiation reduces or destroys "thiaminase" (antithiamine) activity in alewife and clam. The purpose of the present study was to determine the effect of gamma irradiation on the antithiamine activity of skipjack tuna and protein fractions of the water-soluble extracts of the fish muscle. The flesh samples were prepared under air and under N_2 atmosphere. Irradiation was at 1, 2, 3, or 4 Mrad dose levels.

The antithiamine activity (μg. of thiamine destroyed per mg. dry weight) of the water-soluble fish extracts irradiated in air increased at a dosage of 4 Mrad, but activity of that irradiated under N_2 atmosphere decreased. Irradiation had no effect on the antithiamine activity of heme protein fractions of the fish extract separated by $(NH_4)_2SO_4$ precipitation. The water extractable solids from fresh fish irradiated at 4 Mrad in air decreased but those irradiated under N_2 atmosphere did not. The authors believe that the principal effects of irradiation on the antithiamine activity of tuna fish protein involve denaturation of the antithiamine activity to inactive protein.
[2 figures, 2 tables, 11 references]

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0.6 (0.7) EFFECTS OF PROCESSING, STORAGE, AND HANDLING ON NUTRIENT RETENTION IN FOODS

[various authors listed below]
Food Technology 27, No. 1, 16 ff. (Jan. 1973)

Summaries are presented of four papers given at a Symposium on the subject during the 32d Annual Meeting of the Institute of Food Technologists, Minneapolis, Minn., May 21-25, 1972. The papers are as follows:
"Effects of Heat Processing," by D. B. Lund (Dept. of Food Science, University of Wisconsin, Madison, WI 53706), pp. 16, 18.

The desirable effects of heat processing include favorable alteration of the characteristics of the product (browning, improved texture, increased palatability); destruction of microrganisms; destruction of enzymes (peroxidase, thiaminase, ascorbic acid oxidase); improvement in availability of nutrients (gelatinization of starches, increased digestibility of proteins); and destruction of undesirable components (avidin in egg white, trypsin inhibitor in legumes). The undesirable effects of heat processing include adverse changes in protein, amino acids, carbohydrates, and lipids, and losses in vitamins and minerals. [23 references]
"Effects of Dehydration and Storage," by T. B. Labuza, pp. 20-21, 23,25-26, 51.

Dehydration of foods involves many different types of processes, the choice of which depends upon quality and economic considerations. Effects of drying and storage include direct loss of nutrients, and reduction of biological availability of nutrients resulting from their interactions. [81 references]

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0.7 SILICON: AN ESSENTIAL ELEMENT FOR THE CHICK

Carlisle, Edith M. (Environmental and Nutritional Sciences, School of Public Health, University of California, Los Angeles, CA 90024)
Science 178, No. 4061, 619-621 (Nov. 10, 1972)

Silicon, next to oxygen, is the most abundant element in the earth's crust; trace amounts of silicon appear in most animal tissues. Previous studies by the author had shown silicon to be localized in active calcification sites in young bone. She has suggested that silicon is associated with calcium in an early stage of bone formation.

Other workers have suggested a possible physiological function of silicon. But no studies have shown the essentiality of the element. Studies were conducted to determine the essentiality of silicon.

Because of the ubiquitous nature of silicon extra efforts were made to exclude it from diets and equipment necessary in the study. White leghorn chicks were selected for the experiments. Three groups of eight chicks were fed the basal diet (low in silicon), and three similar groups were fed the basal diet plus silicon supplement. The silicon was supplied as sodium metasilicate, $Na_2SiO_3 \cdot 9H_2O$ at a level of 100 parts of silicon per million in the diet. The chicks were evaluated at 2- to 3-day intervals and killed at the end of a 25- to 35-day period.

Silicon was found to increase the growth of chicks in comparison to growth of chicks based on the unsuppelemented diet. The chicks on the unsupplemented basal diet appeared to be stunted; subsequent examination of all organs indicated that they were relatively atrophied. These chicks had no wattles, and the comb

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0.6 (8.)(3.2340) (3.331) CHUB MACKEREL OF THAILAND (RASTRELLIGER NEGLECTUS, VAN KAMPEN): A SHORT STUDY OF ITS CHEMICAL COMPOSITION, COLD STORAGE AND CANNING PROPERTIES

Keay, J. N., P. Rattagool, and R. Hardy (Torry Research Station, Ministry of Agriculture, Fisheries and Food, Aberdeen AB9 8DG, Scotland)
Journal of the Science of Food and Agriculture 23, No. 11, 1359-1368 (Nov. 1972)

The proximate composition, amino-acid content, and fatty acid composition were determined on the chub mackerel of Thailand. Some samples were held in frozen storage to determine their frozen keeping quality. Additional samples were smoked and canned to determine their commercial acceptability.

The proximate composition was: water, 72.0%; crude protein, 20.7%; lipid, 6.5%; and ash, 1.7%. The protein contained the following amino acids expressed as grams of amino acid per 100 grams of protein: aspartic acid, 10.17; threonine, 4.41; serine, 4.47; glutamic acid, 15.46; proline, 3.30; glycine, 4.20; alanine, 6.23; cystine/2, 2.44; valine, 5.64; methionine, 3.73; isoleucine, 5.29; leucine, 8.93; tyrosine, 3.69; phenylalanine, 5.79; histidine, 3.16; lysine, 9.27; and arginine, 6.29.

The results of determination of the chemical indices of deterioration and taste-panel assessments of the frozen-stored fish are described.

The best canned products were obtained from fillets smoked for 45 min. and whole fish smoked for 90 min. in a mechanical kiln, and both canned in maize oil. [2 figures, 6 tables, 21 references] FTP

0.7 NUTRITION LABELING

Anonymous
Nutrition Reviews 30, No. 11, 247-252 (Nov. 1972)

On March 30, 1972 the Federal Register (37F.R. 6493) announced the Food and Drug Administration's proposed regulation on nutrition labeling. In July, under the auspices of the Food and Nutrition Board of the National Academy of Sciences, a small ad hoc group, composed of members of the Board, representatives of the food industry, and several governmental agencies, as well as others with competence in the area of food, nutrition, and/or consumer affairs, was assembled to discuss the proposed regulation. No formal report was prepared, but the Chairman of the group submitted a report to the Commissioner of the Food and Drug Administration which represented the sense of the meeting.

"The Commissioner has concluded, on the basis of the information available at the present time, that nutrition labeling should be based on the following general criteria:

1. Vitamins and minerals should be expressed as a proportion of the Recommended Daily Allowances (RDA) modified to provide a single RDA level for all ages and sexes.
2. The labeling should indicate the caloric content and the amounts of protein, carbohydrate, and fat in the product.
3. The nutrition content should be related to a portion or serving of the food expressed in common household terms or in easily identified units.

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0.7 DIETARY PROTEIN QUALITY MEASURED BY IN VITRO PROTEIN SYNTHESIS IN RAT SKELETAL MUSCLE RIBOSOMES

Von Der Decken, Alexandra, and P. T. Omstedt (Wenner-Gren Institute, Stockholm, Sweden)
Journal of Nutrition 102, No. 12, 1555-1562 (Dec. 1972)

For 6 consecutive days rats were fed a diet containing either 10% or 20% protein of varying biological values. Ribosomes of skeletal muscle were isloated. The RNA content per gram wet weight of muscle was higher in the ribosomal preparations of the casein-fed than of the wheat gluten-fed rats. This RNA was shown by polyacrylamide gel electrophoresis to be of ribosomal origin. The proteins present in the ribosomal preparations seemed unchanged when expressed per unit wet weight of muscle. The small alterations in protein due to changes in ribosomal content could not be detected by the analytical methods used. The amino acid-incorporating activity of the skeletal muscle ribosomes was measured. When diets containing 10% protein were fed the isotope incorporation relative to protein was highest with casein as the protein source, followed by barley and soya protein or wheat gluten in that order. These differences correlated well with their biological value but less well with their protein efficiency ratio. Calculations of the radioactivity values relative to ribosomal RNA gave no differences in activity between the groups of rats. When diets containing 20% protein were fed the effect on protein synthesis was more pronounced and apparent also relative to ribosomal RNA. In addition, the activity of liver ribosomes per RNA--but not per protein--was higher in the casein-fed than in the wheat gluten-fed rats. The amino acid-incorporating activity of skeletal muscle ribosomes was positively correlated with the biological value of the dietary protein both at a 10% and a 20% level while the agreement with the protein efficiency ratio was less marked.
[7 tables, 25 references]

Authors' abstract

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4. A complete listing of the seven important vitamins and minerals should appear on all products unless the product contains essentially none of those vitamins or minerals.
5. A listing of protein content should appear on all products unless the product contains no protein."

Reprinted in part

0.6 EFFECT OF HEAT TREATMENT ON FISH MUSCLE PHOSPHOLIPID COMPOSITION

El-Bastavizi, Mohamed A., and G. A. Smirnova (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 13, 86725q (Sept. 25, 1972)

0.6 (0.7)

"Effects of Food Service Handling," by G. E. Livingston, Catharina Y. W. Ang, and Charlotte M. Chang (Food Science Associates, Inc., 145 Palisade St., Dobbs Ferry, NY 10522), pp. 28-30, 32, 34.

Thirty or more categories of the food service industry are involved in the feeding of different portions of the population. In the optimization of retention of nutrients naturally occurring in foods, three stages require particular attention: raw material handling, food preparation, and service of prepared food.
[47 references]

"Effects of Reheating Convenience Foods," by Paul A. Lachance, Arvind S. Ranadive, and Jonathan Matas (Dept. of Food Science, Rutgers University, New Brunswick, NJ 08903), pp. 36-38.

In the preparation and storage of canned and frozen fruits and vegetables, vitamins and minerals are lost due to trimming, blanching, extracting, straining, and leaching. The extent of loss depends on many factors including temperature, time, packaging material, and others. Before consumption, foods are further exposed to heat, light, and oxygen and are subject to additional losses of nutrients. For most fruits and vegetables, for example, loss in vitamin content due to reheating of processed products ranges from 20 to 50%. [17 references]

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was severely attenuated. The bones of these chicks were shorter, thinner, and more flexible than those of normal chicks.

The level of silicon found to be effective for normal growth is on the order present in plant and animal foodstuffs. The discovery of the essentiality of silicon has many implications: (1) from an evolutionary point of view, silica is known to perform a skeletal role in some primitive organisms; and (2) although the toxicity and carcinogenic effects of silica and fibrous silicates have received attention, silicon as a participant in normal metabolism must now be considered. [1 figure, 1 table, 17 references]

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0.7 (2.8)(5.4) EFFECT OF MICROWAVE HEATING ON VITAMIN B_6 RETENTION IN CHICKEN

Wing, R. W., and J. C. Alexander (Dept. of Nutrition, University of Guelph, Guelph, Ontario, Canada)
Journal of the American Dietetic Association 61, No. 6, 661-664 (Dec. 1972)

Microwave cooking (at a frequency of 2,450 megahertz for 1.5 min.) resulted in significantly greater retention of vitamin B_6 in the meat than did roasting by conventional oven (at 162.7° C. to an internal temperature of 88° C.). Pertinent data are shown in the tables that follow.

Sample number	Vitamin B_6 content of chicken breast in mcg./g.		
	Raw	Microwave cooked [1]	Conventionally cooked [2]
1	19.2	15.4	16.6
2	17.2	16.6	16.3
3	22.0	18.0	15.5
4	22.2	21.1	16.9
5	18.2	20.6	16.2
6	17.2	15.5	16.1
7	25.0	24.1	19.4
8	21.7	20.3	14.4
9	19.1	15.6	17.6
10	20.6	17.7	18.4

[1] Heated for 1.5 min.
[2] Heated for 45 min.

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1.0161 RESULTS OF THE UNDP(SF)/FAO REGIONAL FISHERIES SURVEY IN WEST AFRICA. REPORT NO. 1. DEEP-SCATTERING SARDINELLA AURITA OFF MAURITANIA

Schmidt, W. (Abidjan, Ivory Coast, Africa)
Marine Biology 16, No. 2, 91-101 (Sept. 1972)

The northwest African shelf area between Cape Bojador (lat. 26° N.) and Cape Verga (lat. 10° N.) has rich resources of small pelagic fish. Caranx (jacks), Trachurus (jack mackerel), Sardinella (sardine), and Scomber (mackerel) are the most important groups found in this area throughout the year. Local fisheries and industrial foreign fleets exploit these stocks. Trawlers and purse seiners supported by factoryships have increased through the years: the total catch for 1970 was estimated at 1.5 million metric tons.

Catches can be low when the warm water front moves very rapidly north in April and May. S. aurita appear and disappear rapidly and irregularly from one region to another. During this period the fleets disperse over a large area searching for fish. The fish are not detectable by acoustic equipment during this period. Observations of this phenomenon were made during cruises of the charter vessel Thue, Jr. of the Regional Fisheries Survey.

Seasonal upwelling with shifts of warm and cold water masses characterize the area. The fish migrate north or south with respect to the thermal front. Maximum abundance of fish was found at the interface between warm and cool water. S. aurita are rarely caught over the shelf in the Senegal-Mauritania region during the rapid northward shift of the warm water masses (April and May).

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1.0112 (1.0154)(1.55) PACIFIC POLLOCK -- THE WORLD'S LARGEST FOOD FISH RESOURCE

Alverson, Dayton L. (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Seattle, WA 98102)
Fishing News International 11, No. 12, 17, 18, 21 (Dec. 1972)

Pacific pollock is a member of the family Gadidae; its habitat is the North Pacific Ocean, occurring from Japan on the west to northern California on the east. Pollock is abundant in the Sea of Japan; the continental shelf and slope off Hokkaido, Sakhalin, Kamchatka, and the Kuriles; the eastern Bering Sea; and the northern Gulf of Alaska. Growing relatively fast during its first 3 to 4 years of life, it may attain a length of more than 60 cm., and live 10 to 12 years. It reaches maturity in 3 to 4 years at lengths of 30 to 40 cm. As with many related cod species, the pollock produces, depending on size, from 100,000 to over a million eggs during the winter and spring months. Spawning occurs in near coastal waters of sluggish or gyral currents at temperatures less than 5° C.

The larvae lie in near-surface waters, while postlarval juveniles rise toward the surface at night and descend toward mid or bottom depth with the onset of daylight. The juveniles inhabit waters on the inner continental shelf.

Adult pollock are reported to be abundant in waters on the continental shelf at depths of 44 to 82 fathoms, actively feeding, in summer and early autumn. As winter approaches, they migrate to the upper continental shelf in depths of 110 to 160 fathoms. Their food consists of small crustaceans, particularly euphausiids, copepods, and amphipods.

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1.22 (1.01111) LENGTH, AGE AND WEIGHT OF HERRING IN THE SOUTHWEST NEWFOUNDLAND WINTER FISHERY FROM 1965-66 TO 1970-71

Hodder, V. M., L. S. Parsons, C. I. Barbour, and R. Chaulk
Fisheries Research Board of Canada Technical Report No. 339, 93 pp. (1972). (Fisheries Research Board of Canada, Biological Station, St. Johns, Newfoundland, Canada)

In the winter of 1965, exploratory fishing in Newfoundland waters resulted in discovery of large concentrations of herring. These fish were found to overwinter in the fjords of the western part of the south coast. The concentrations of herring were found by other studies and tagging experiments to migrate from the Gulf of St. Lawrence beginning in October. In southwestern Newfoundland waters the seasonal catches increased from 5,000 metric tons in 1964-65 to about 140,000 metric tons in 1968-69 and 1969-70. Investigations were begun to elucidate the size, distribution, biology, and migratory behavior of the herring stocks that supported this winter purse-seine fishery. Emphasis was placed on the sampling of seiner catches and of capture information from logbooks and port interviews.

Results of the investigations showed that there has been an increase in the average size of herring since 1965. The modal size increased from 32 cm. to 35 cm. in the 1970-71 season, and the average length from 32.7 to 34.5 cm. The narrow range and the gradual increase in size implies that a narrow range of year-classes was present in the fishery.

The composition of the samples by maturity stages indicated a mixture of two spawning groups--spring and autumn, with the latter predominating. This information also indicated that the average size and age of the two spawning groups

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1.0112 (1.0154)(1.55)

Pacific pollock abundance in the eastern corner of the Bering Sea alone is estimated to be at least 1,400,000 metric tons. Japanese, United States, and U.S.S.R. scientists have speculated that pollock is one of the most abundant fish in the North Pacific. To illustrate the difference of a decade in production, landings of pollock, in 1,000 metric tons, by countries traditionally producing the majority of pollock catches, in 1961 and 1970 were as follows: Japan, 353.3--2,346.7; U.S.S.R., 97.6--697.0; and Korea, 13.7--13.4. These increases reflect expanded fishing operations with the exception of Korea. A high proportion of the Japanese catch came from home waters. They have now extended operations to the Eastern Bering Sea.

The major source of catches by fleets from the U.S.S.R. is off the west coast of Kamchatka. They also fish in the eastern Bering Sea and the Gulf of Alaska. In the Sea of Japan, adjacent to Hokkaido, pollock is caught by longline, gill nets, and bottom trawls. In the northern waters off Kamchatka and the Kuriles, bottom trawls are used. In the Bering Sea, bottom trawls by paired trawlers and Danish seines are used.

The Japanese process pollock into fish meal and minced fish meat. A small amount is sold fresh. In Korea, the fish is frozen and dried.

The major available documentation and distribution of catches in this fishery is of Japanese origin. These data are being studied to determine catch patterns. Rapid growth of the fishery, its geographic expansion, changes of fishing gear and vessels, and improvement in fishing strategy complicate what good statistics can illuminate. To attack the problem a symposium of representatives of North Pacific rim nations, with FAO sponsorship is planned in early 1973.
[2 figures, 1 table]

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of herring have gradually increased over the past 5 to 6 years and that the fishery has been maintained through the period by an abundance of pre-1960 year-classes. In addition, recruitment has been relatively poor since the appearance of the 1958 and 1959 year-classes.
[7 figures, 65 tables, 24 references]

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[5 figures, 1 table, 5 references]

This bulletin describes a portable data collection system for fishery resource assessment that can be used on small boats. Such a system is desirable because it reduces the cost of surveys, permits access to remote locations (where large vessels are not available), and eliminates the risk of failure due to malfunction of data processing equipment. The system consists of an echo sounder with an internal calibration oscillator, a chart recorder and transducer mounted on a towed vehicle, and an analogue magnetic tape recorder with an interface for converting acoustic data to a frequency compatible with the tape recorder. The entire system is monitored with an oscilloscope; it is powered by a 12-volt battery in conjunction with an inverter. The echo sounder data recorded on the magnetic tape are then processed in the laboratory by data processing systems such as echo integrators and echo counters.

0.8 (2.12) A PORTABLE HYDROACOUSTIC DATA ACQUISITION SYSTEM FOR FISH STOCK ASSESSMENT

Thorne, Richard E., Edmund P. Nunnallee, and James H. Green
WSG 72-4, 14 pp. (Dec. 1972) (Division of Marine Resources, University of Washington, Sea Grant Program, Seattle, WA 98195) Price not given.

0.7 (2.8)(5.4)

Cooking treatment	Weight loss of chicken breast	Volume of drip formed	Moisture content of cooked meat
	%	ml./100 g.	%
Microwave	26.6	2.69	65.5
Conventional	22.7	3.95	67.5

Cooking treatment	Relative amount of vitamin B_6 retained expressed as a percentage of the raw meat		
	Cooked meat	Drip	Total
Microwave	91	1.5	92.5
Conventional	83	5.4	88.4

[1 figure, 5 tables, 16 references]

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S. aurita migrate between Cape Verde (lat. 14°45' N.) and Cape Timiris (lat. 19°30' N.) beyond the slope of the continental shelf. Large concentrations were found at depths between 200 and 350 m.; the seabed sounded 600 to 1,500 m. deep. They migrate with the 18° C. surface isotherm at a speed of 30 nautical miles per day. After dusk they ascend to the surface at a rate of 2 to 2.5 m. per minute. Catches up to 150 metric tons per vessel per night were then taken by commercial purse seiners. The deep scattering S. aurita were not confined to a definite temperature. They migrated through a difference of more than 6° C. During the day they stayed in waters at temperatures of 12° to 13° C., and at night they ascended to the surface waters at 18° to 19° C.
[7 figures, 1 table, 4 references]

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1.3 PACIFIC MARINE FISHERIES COMMISSION. BULLETIN 8, 1972

Verhoeven, John P. (editor)
Pacific Marine Fisheries Commission Bulletin, No. 8, 84 pp. (1972) (342 State Office Building, 1400 S.W. Fifth Avenue, Portland, OR 97201)

Bulletin No. 8 contains the following articles. Plugs (Lures) in the management of the California Troll Salmon Fishery by L. B. Boydstun. p. 5; Estimated Numbers of Salmon Hooked and Released by Washington's Commercial Troll and Ocean Sport Fisheries in 1970-1971, by Sam Wright, p. 15; Experimental Use of Barbless Hooks in Oregon's Troll Salmon Fishery, by Jerry A. Butler and Robert E. Loeffel, p. 23; Geographic Origin Trends and Timing of Washington's Troll Salmon (Oncorhynchus) catches, 1960-1969, by Sam Wright and Richard Brix, p. 31; Size and Characteristics of Chinook Salmon Taken by Washington's Commercial Troll and Ocean Sport Fisheries, 1963-1969, by Sam Wright, Richard Kolb, and Richard Brix, p. 37; Maturity Rates of Ocean Caught Chinook Salmon, by Sam Wright and John Bernhardt, p. 49; Evaluation of the March 15-April 15 Pacific Coast Troll Chinook Closure, by Peter K. Bergman and Robert E. Loeffel, p. 61; Economic Evaluation of Washington's 1967 Troll Salmon Fleet, by Mike Fraidenburg, p. 75, and Comparison of Retention of Anchor and Spaghetti Tags by Salmon, by Jerry A. Butler and Robert E. Loeffel, p. 81. SW

1.87 INVESTIGATIONS INTO THE EFFECTS ON LOBSTERS OF RAKING IRISH MOSS, 1970-1971

Scarratt, D. J.
Fisheries Research Board of Canada, Technical Report, No. 329, 20 pp. (1972) (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada)

The value of seaweeds harvested from the Canadian Atlantic Provinces in 1970 was $3 million. About half of this amount is the value of moss harvested off Prince Edward Island. Most of the seaweed is Chondrus crispus, Irish moss. Rakes are used to dislodge the moss from the rocks. The rakes are up to 9 ft. (3 m.) wide and are towed by power boats at about 2 knots.

In contrast, the lobster fishery has been the principal inshore fishery resource of the provinces. Landings have fluctuated between 7.4 and 10.1 million pounds annually. In 1970, the catch was 8.2 million pounds valued at $5.8 million.

Most of the areas raked for moss are also fished for lobsters, sometimes intensively. Under these conditions raking for moss could never begin until the end of the lobster season because of the large number of traps on the bottom. There was no conflict between the two activities until mechanized rakers entered areas where moss had not been gathered before. The number of broken lobsters seen in mechanically raked moss was higher than in older raked areas and there was concern among lobster fishermen that damage to the stocks and the ground would result from continued raking.

Investigations of the conflicting interests were undertaken. The results indicated that damage to lobster stocks by moss raking is related to abundance of

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1.93 SOME OBSERVATIONS OF SEA TURTLE NESTING ACTIVITY IN COSTA RICA

Richard, J. D. (Div. of Functional Biology, Rosenstiel School of Marine and Atmospheric Science, Miami, FL 33149), and D. A. Hughes (P.O. Box 104, Barberton, E. Transvaal, South Africa)
Marine Biology 16, No. 4, 297-309 (Oct. 1972)

Marine turtles are particularly vulnerable to predation, human and other, when they congregate off nesting beaches and when they come ashore to nest. Most species of marine turtles show an apparent strong preference for particular nesting beaches, and they are sometimes able to return to such beaches in subsequent years. This study was made along the coasts of Costa Rica to learn more about the process of nesting-site selection, and to identify possible relationships between spatial distribution of nesting activity and the physical features of the coast and contiguous waters.

Observations of sea turtle nesting activity and physical characteristics of the coast were made from a low-flying airplane. The distribution of tracks along both coasts showed that nesting activity does not correlate well with nesting sites, but seems to be related to proximity and accessibility of the beach to offshore current systems. Such currents have a significant role in transporting sea turtles to the vicinity of nesting beaches.

Two major nesting beaches of the Pacific Ridley Lepidochelys olivacea were found on the west coast of Costa Rica each having aggregations of over 100,000 females during the months of September to November. The same beach is used in

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2.00 POST-MORTEM BIOCHEMICAL CHANGES IN THE MUSCLE OF GULF SHRIMP, PENAEUS AZTECUS

Flick, George J., and Richard T. Lovell (Dept. of Food Science, Louisiana State University, Baton Rouge, LA 70803)
Journal of Food Science 37, No. 4, 609-611 (July-Aug. 1972)

This work was carried out to expand our knowledge on the biochemical changes that take place post-mortem in the muscle of Gulf shrimp. The objective was to compare the postmortem degradative pathways in shrimp with those in other marine and terrestrial animals so as to provide a meaningful biochemical definition of rigor mortis in shrimp muscle, and to examine the possibility of some of these degradation products serving as indices of quality of chilled shrimp. The brown shrimp were held and fed in live holding tanks for 2 to 4 days before being used in the tests. They were quickly slaughtered by snipping off their heads with scissors. Samples for immediate (0-time) analysis were dropped into liquid nitrogen. The samples for analysis following storage were packed in plastic bags and immersed in crushed ice. Determinations were made for adenosine triphosphate (ATP) adenosine diphosphate (ADP), adenosine monophosphate (AMP), inosine monophosphate (IMP), inosine (INO), and hypoxanthine (Hx) using thin-layer chromatography (polyethyleneimine cellulose on thin-layer chromatograms) and spectrometric analysis. Glycogen, lactic acid, and orthophosphate content were measured by colorimetric methods of analysis; pH was also determined; and the storage time was 10 days.

The route of degradation of ATP was: ATP→ADP→AMP→IMP→INO→Hx. Glycogen content decreased from 160 mg. per 100 g. of tissue to 70 mg. after 10 days' storage of

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lobsters and roughness of terrain. Where moss beds are smooth, cover for lobsters is scarce, and the number of lobsters will be low. On rougher terrain, lobster numbers will be high. They will be under boulders and few will attempt to avoid the rake.

Based on the information gathered from the investigation, recommendations were made to: (1) develop more effective, less damaging moss harvesting systems; (2) establish seasons for moss raking that would provide for good moss harvest and not conflict with lobster fishing; (3) limit the number of moss rakers; and (4) continue prohibition of moss raking off the eastern coast of Prince Edward Island to prevent damage to the lobster harvest.

[2 figures, 12 tables, 9 references]

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the shrimp in ice. At the same time, the lactic acid level increased from 160 mg. per 100 g. of tissue to 370 mg. During the 10-day storage period, pH rose from 7.4 to 8.2 orthophosphate decreased from 3,078 µg. per 100 g. of tissue to 725 µg.

The initial IMP level in the shrimp was much higher than that found in mammalian muscle. IMP probably contributes to the characteristic flavor of fresh shrimp. Hypoxanthine accumulated in large quantities during storage of the shrimp. Perhaps hypoxanthine could be used as an indicator of the length of time shrimp have been held in iced storage. Flavor deterioration of the iced shrimp might be related to the production of inosine and hypoxanthine. The glycogen levels in shrimp are lower than those in fish, but the glycogen decrease-lactic acid increase pattern is similar to that of other marine animals and of land animals. However, there was not an initial postmortem drop in pH of the shrimp tissue, and this phenomenon may be unique for shrimp.

[2 figures, 1 table, 21 references]

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1.953 THE WHALE

Cousteau, Jacques-Yves, and Philippe Diolé
Translated from the French by J. F. Bernard
Published by Doubleday & Company, Inc., Garden City, N.Y. (1972), 304 pp. Price not given.

This book is an attractive collection of information on whales. Accompanied by color photographs that augment the text, the life and habits of the whale are explained. References to modern techniques of hunting the whale and how this type of hunting has endangered several species is described. The basic food of the baleen whale, krill (Euphausia superba) existing in polar water in great abundance, is described. The book has an index and a bibliography.

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successive years. The aggregation of Ridleys off each of the nesting beaches is a gradual and continuing process. starting in July about 10,000 aggregate, and the number increases to above 100,000 before October. Large numbers persist into December.

The distribution of tracks suggests that river effluents are important in the aggregation of the turtles off a particular nesting beach and in subsequent recognition of the same beach.

Observations on the Pacific coast beaches indicate that over 500,000 sea turtles, 90% of them being Ridleys, nest yearly. Costa Rica is unique in the number and variety of sea turtles nesting on its shores. This phenomenon may be attributable to the geographical position of the country relative to the oceanic current systems off both coasts.

[8 figures, 11 references]

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2.00 (4.5) OXIDATIVE RANCIDITY IN RAW FISH FILLETS HARVESTED FROM THE GULF OF MEXICO

Mendenhall, V. T. (Dept. of Food Science, University of Florida, Gainesville, FL 32601)
Journal of Food Science 37, No. 4, 547-550 (July-Aug. 1972)

The oxidation of raw fish muscle at refrigerated temperatures has not been considered significant to spoilage because most of the deterioration was attributed to microbial spoilage. More recent work seems to indicate that oxidation of the raw fresh fish muscle may be important in the deterioration of the meat stored at refrigerated temperatures. Eight species of fish (trout, grouper, blue fish, grunt, whiting, mullet, black sea bass, and mackerel) from the Gulf of Mexico were filleted and the skinned fillets were stored at 1° C. for from 8 to 15 days, depending upon the test series. The TBA (2-thiobarbituric acid) number (a measure of oxidative rancidity), total plate count, and sensory panel evaluations were made at periodic intervals during the storage period.

The development of oxidative rancidity (as determined by TBA values) was most important in the mullet fillets. The TBA numbers increased concurrently with decreases in the quality of the mullet fillets before the total plate count reached 400,000 bacteria per gram. Apparently, oxidative rancidity seemed to be more important than did microbial growth in the spoilage of mullet fillets stored at 1° C.
[1 figure, 5 tables, 18 references] FTP

2.05 (0.5) INCIDENCE OF VIBRIO PARAHAEMOLYTICUS IN SHELLFISH FROM EIGHT CANADIAN ATLANTIC SAMPLING AREAS

Thomson, W. K., and C. L. Thacker (Dept. of National Health and Welfare Research Laboratories, Health Protection Branch, Ottawa, Ontario, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1633-1635 (Nov. 1972)

V. parahaemolyticus, a pathogenic halophilic bacterium, is frequently implicated as the cause of food poisoning in Japan. During July to October 1971, 78 cultures of the organism, closely resembling strains isolated from human cases in Japan, were isolated from clams, mussels, and oysters from eight Canadian Atlantic areas. About 22% of the shellfish that were examined yielded cultures of V. parahaemolyticus; about one-half of the samples were detectable by direct plating, and the remaining one-half required enrichment procedures to facilitate detection of the small number of cells present. Because the numbers of V. parahaemolyticus in the shellfish appeared to be small, the possibility of food poisoning from the consumption of such small numbers would be unlikely. Earlier work by M. R. Smith [Cli. Med. 78, 22-25 (1971)] indicated that enteritis in man requires the ingestion of 10^6 to 10^9 bacteria. Nevertheless, the possibility of human disease cannot be completely dismissed if shellfish are not properly refrigerated during handling, storage, and transportation (V. parahaemolyticus multiples at temperatures as low as 10° C.).
[1 figure, 2 tables, 16 references] FTP

2.119 SURVIVAL AT SEA

Anonymous
Australian Fisheries 31, No. 10, 12-15 (Oct. 1972)

The worst that can happen to a boat is to be wrecked on a reef, burnt out, or capsized in a cyclone. If a fishing vessel goes down far from land or in a particularly remote area, in some circumstances, it may be days or even weeks before survivors can be found and picked up. Those adrift at sea for long periods must have determination and discipline, if they are to survive.

Morale, the first essential to survival, is a combination of willpower and determination to live, good discipline and good leadership. Every precaution should be taken to ensure that survival equipment is checked out before each voyage. First-aid kits and emergency packs should be complete, and liferafts should be inspected for chafing and wear. Since quick rescue depends upon the cooperation of the survivors, logically the ship's position should be radioed to the Coastal Radio Station when trouble is suspected. The CRS should be aware of the type of radio equipment that is being used in the liferaft so that they will know which frequency to use in planning rescue.

The following rules should be known and used when rescue is delayed: if you have to abandon ship, do not discard clothing; swim slowly and steadily; if necessary to swim through fire, jump upwind of the boat, feet first; swim into the wind using the breast stroke, and try to make breathing holes by splashing the flames away from head and arms; always try to protect yourself from the cold and extremes of temperature; in hot climates, clothing should be discarded, but the whole body should remain covered with one thin layer of material; the head and neck should especially be protected from the sun's rays.

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2.1471 PAIR TRAWLING FOR HERRING IN NEW ENGLAND

Taber, Robert E. (Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882), and James W. McLeod (Killybegs, Ireland)
Marine Bulletin Series No. 9, University of Rhode Island, 19 pp. (1972) Available from Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882)

Pair trawling may be as much as eight times more effective than single-boat midwater fishing depending on the type of fishing ground and size and horsepower of vessel. For a single boat operation minimum horsepower is about 600; however, under special conditions it may be as low as 350 and as high as 800. In contrast, in pair trawling the minimum horsepower for each vessel is about 150. The prime variables that determine minimum horsepower are net design, water depth, and whether the herring are spawning. Large mesh in trawls has greatly increased their fishing effectiveness. The large mesh reduces the drag and pressure wave of the trawl. Water depth is important due to the effect of vessel noise on herring. Down to 30 fathoms noise and lights will drive the herring away. The condition of herring is important. They become lethargic and easier to catch when spawning or ready to spawn.

The fishing grounds in the vicinity of Point Judith, R.I., vary in depth from 10 to 30 fathoms. The vessels fishing this area range in horsepower from 170 to 420. Single vessel fishing was not very successful in the period January to March 1972. In the same period, pair trawling over the same ground was much more successful.

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2.05 EMERGING FOODBORNE DISEASES: II. FACTORS THAT CONTRIBUTE TO OUTBREAKS AND THEIR CONTROL

Bryan, Frank L. (Center for Disease Control, Public Health Services and Mental Health Administration, Dept. of Health, Education and Welfare, Atlanta, GA 30333)
Journal of Milk and Food Technology 35, No. 11, 632-638 (Nov. 1972)

Factors that contribute to foodborne disease outbreaks can occur at any point during production, processing, packaging, transportation, storage, preparation, and service. The factors involved may encourage contamination of foods with pathogens or toxic agents, or permit multiplication of bacteria. Also, certain procedures designed to destroy pathogenic organisms may fail in their purpose. This article is a review of the impact of change in food production, processing, and preparation on the foodborne disease problem and reports the results of a survey of factors that contributed to 493 foodborne disease outbreaks during the last 10 years. The 7 most significant of 18 identified factors were failure to properly refrigerate foods; poor personal hygiene practices by infected employees; preparing foods a day or more before they are served; adding raw, contaminated ingredients to foods that receive no further cooking; allowing foods to remain at warm temperatures; failure to reheat cooked foods properly; cross contamination; and failure to disinfect kitchen or plant equipment.
[1 table, 17 references]

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2.3 SHRIMP PROCESSING

Letchworth, H. R.; Seafoods Automation Corp. (pat.)
U.S. Patent 3,696,466
Food Technology 27, No. 1, 82 (Jan. 1973)

This apparatus is used for positioning shrimp during a processing stage.

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2.3 METHOD AND APPARATUS FOR REMOVAL OF OIL FROM SURFACE OF FRIED FOOD PRODUCTS

Davidson, Arthur R.,(West Linn, Oreg., U.S.A.), and John E. Haubner (Tigard,Oreg., U.S.A.) granted to Lamb-Weston Inc., Portland, Oreg., U.S.A. (pat.)
Canadian Patent 911,802
Patent Office Record (Canada) 100, No. 41, 4209 (Oct. 10, 1972)

After the food product is cooked in hot oil, it is removed from the oil and, to remove oil on the surface, immediately subjected to a blast of air saturated with water vapor.

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2.1471

A pair of side trawlers were used in trials of pair trawling. One was a 59-ft. wooden, eastern port-rigged trawler with a 220 hp. engine; the other was a 70-ft. wooden, eastern starboard-rigged trawler with a 170 hp. engine. The larger trawler handled the trawl, both weights, and the tow wires. For both tow wires and legs, 3/8-in. wire rope was used with a 2-fathom differential added to the bottom legs. After the shooting operation the smaller vessel came alongside the larger and was connected to the other tow wire of the trawl. The vessels spread apart to half the warp length out and began the tow. To haul, the reverse was followed. The capability of pair trawling was established in a few days of fishing. Pair trawling produced more than a third of all herring landed at Point Judith.

The advantages of pair trawling are: (1) the vessels' noise herds the herring toward the path of the trawl for water depths to 30 fathoms; (2) vessel power is used more efficiently because doors are not required; (3) the actual mouth opening of the trawl is wider for pair trawlers; (4) capitalization per vessel is generally about half that for a single boat operation; and (5) searching and fishing modes are more effective. The disadvantages of pair trawling are: (1) the crew and skippers of both vessels must work together physically and emotionally; and (2) in general, the depth of trawl cannot be controlled by speed of tow, but it is regulated by length of tow warp.

Useful information is included as: net plan diagram, warp angle meter that can be made by the fisherman, an illustration of a quick release towing hook, tables for warp angle related to warp length, herring landings from both types of fishing at Point Judith, and sample recordings of herring shoals.
[7 figures, 2 tables]

SW

2.119

If there is no radio equipment or radio beacon, the heliograph or in its place a mirror, smoke generators, flares, and fluorescine dyemarkers must be ready for immediate use to aid detection. Fresh drinking water, the survivor's most essential need, can be limited to 1 pint (20 ounces) per day to keep fit, but survival is possible on 2 to 8 oz. a day. Suggested rationing is as follows: 1st day--no water, except for the injured; 2d to 4th day--14 oz. per head daily, if available; 5th day onwards--2 to 8 oz. per head daily, depending on the climate and the water available. Collect rainwater from the dinghy canopy and fill all available containers, but on no account should sea water be drunk because it contains more salt than the body can excrete. Alcohol and urine are also dangerous to drink, and fish juice is a poor substitute for water.

Obviously the preservation of water in the body is as important as having water to drink. Sweating, a potent cause of water loss, can be reduced by keeping cool, using sea water to dampen the body, and by taking advantage of the breezes. Sleep and rest are most important; exercise must be kept to a minimum. Vomiting should be prevented if possible and the mouth could be kept moist by sucking on a piece of cloth or button.

Only carbohydrate foods should be eaten when water is low because foods high in protein need more water for metabolism. Live off natural foods if water permits and save emergency rations for the real emergency when water is low. Some natural foods are fish, seaweed, and seabirds. The lower the dinghy rides in the water, and the lower its occupants sit or lie, the greater will be the effect of the current. If there is no compass, remember position can be deduced from the angle of the sun and the direction of the stars. The presence of an island can be detected long before it can be seen by observation of: cumulus clouds, seabirds, lagoon glare, or drifting wood and vegetation. [2 figures, 1 table]

Mary Ellen Engett

2.143 (0.8) VOLTAGE AND PULSE RATES FOR INDUCING ELECTROTAXIS IN TWELVE COASTAL PELAGIC AND BOTTOM FISHES

Klima, Edward F. (National Marine Fisheries Service, Southeast Fisheries Center, Pascagoula Laboratory, Pascagoula, MS 39567)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1605-1614 (Nov. 1972)

Observations, at the laboratory level, were made on the reaction of certain fish to different voltages and direct current pulse rates. Such information on the electrical characteristics needed for inducing electrotaxis in fish would be useful in the designing of an automated fish harvesting system. The pelagic fish used were chub mackerel, scaled sardine, Spanish sardine, round scad, bumper, rough scad, Atlantic thread herring, round herring, silver anchovy, and butterfish; the bottom fish were Atlantic croaker, spot, and longspine porgy. The optimal electrical combinations for 12 of the fish varied according to species and length. The effective combinations ranged from 1.5 to 3.0 volts per 10 cm. and pulse rate of from 15 to 45 pulses per second with a pulse duration of 1.0 msec.
[6 figures, 5 tables, 17 references]

FTP

2.43 (3.238) MICROBIAL ACTIVITIES THROUGH WRAPPING MATERIALS

Blankenagle, G. (Dairy & Food Science, University of Saskatchewan), and J. W. Card
Canadian Institute of Food Science and Technology Journal 5, No. 4, 222 (Oct. 1972)

A major requirement of food wrapping material is to function as a barrier to microorganisms in the external environment. Nearly all materials for packaging perishable foods are impervious to cells of bacteria, yeasts, and molds; however, to retain desirable characteristics of food, such as meat color, several wrapping materials are designed to allow the passage of moisture and air. Consequently, nutrients may pass through the wrapping material and result in microbial growth on the outside of the package with subsequent changes in the food.

Ten films used as casings or wrappers for meat products were tested. Pieces of film 5 cm. in diameter were autoclaved; similar samples were not sterilized. The samples were placed on violet-red bile agar to test for growth of Escherichia coli and standard plate count agar for growth of Streptococcus lactis. A small amount of each organism was streaked on the wrapping materials in the plates without contacting the substrate agars. After incubation at 21° C. for 18 hr., the plates were examined for growth. The table shows the growth on various materials tested. Results of autoclaved samples were identical with those that were unautoclaved. Moistureproof wrappers did not permit growth.

(over)

2.3 LASER MODERNIZES OYSTER SHUCKING

Singh, Gurbax (Dept. of Natural Sciences, University of Maryland, Eastern Shore, Princess Anne, MD 21853)
Food Technology 26, No. 12, 60-61 (Dec. 1972)

Preliminary experimental work was carried out on the use of a laser beam to shuck oysters. A CO_2 laser with a 70-watt average power output was used. The beam was focused at a position on the shell where the adductor muscle is attached. The heat generated on this portion of the shell destroyed the adhesive layer of connective tissue and loosened the muscle from the side of the shell. As a result, the oyster gaped and the one side of the shell could then be detached. In these tests, the laser beam was applied only to one side (upper) of the shell--the oyster meat was then cut loose from the bottom shell. From 30 to 60 sec. were required to shuck an oyster (3.5 to 7.0 in. in length) using the low-power CO_2 laser. Future work might include use of higher power laser beams and the automatic exposure of both sides of the shell. Although considerably more research and development work is required, the author believes that the method might be economically adaptable to commercial use.
[3 figures, 5 references]

FTP

2.9 PARALYTIC SHELLFISH POISON AND MELANIN DISTRIBUTION IN FRACTIONS OF TOXIC BUTTER CLAM (SAXIDOMUS GIGANTEUS) SIPHON

Price, R. J., and J. S. Lee (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1657-1658 (Nov. 1972)

In a clam containing paralytic shellfish poison (PSP), the PSP is not evenly distributed; as much as 88% may accumulate in the siphon. The area of concentration appears to be associated with areas of melanin pigmentation. The present study was carried out to determine the distribution of PSP in fractions of toxic butter clam siphons in relation to that of melanin. The purpose was to find out if PSP is associated with the melanin in vivo.

Frozen toxic butter clam siphons containing about 10,000 mouse units of PSP per gram were used. The siphons were allowed to thaw and the meat and drip were separated. The thawed drained siphons were assayed for PSP; the remaining portion was then sonicated by a procedure described by R. J. Price and J. S. Lee [J. Fish. Res. Bd. Canada 28, 1789-1792 (1971)]. The sonicated siphon residue and the (sonication) melanin suspension were analyzed for PSP and for melanin. The original drip was assayed for PSP and for melanin.

The drip contained 11% of the PSP and 15% of the melanin originally present in the toxic clam siphons. The sonicated siphon residue contained 43% of the PSP and 32% of the melanin. The (sonication) filtrate contained 46% of the PSP and 53% of the melanin. The results appear to further implicate melanin as the paralytic shellfish poison binding agent in vivo.
[1 figure]

FTP

2.3 CRAB PROCESSING

Rossnan, M. (pat.)
U.S. Patent 3,692,465
Food Technology 27, No. 1, 82 (Jan. 1973)

Removal of visceral contents of cooked crab bodies is aided by the use of water pressure alone, or with air or suction. FTP

2.3 APPARATUS FOR PROCESSING SHRIMP AND RELATED SHELLFISH

Jones, John M., Jr. (206 Grubb St., Hertford, NC 27944) (pat.)
U.S. Patent 3,703,746 (Nov. 28, 1972)

This apparatus removes the heads of the shellfish. The meaty portion is then deveined, deshelled, and graded for size. It is designed for use on shrimp and related shellfish on board the trawler. FTP

2.3 YIELD AND ACCEPTABILITY OF MACHINE SEPARATED MINCED FLESH FROM SOME MARINE FOOD FISH

Crawford, D. L., D. K. Law, and J. K. Babbitt (Dept. of Food Science and Technology, Oregon State University Seafoods Laboratory, Astoria, OR 97103), and L. S. McGill (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Food Science 37, No. 4, 551-553 (July-Aug. 1972)

The yield and acceptability of machine separated minced fish flesh from orange rockfish, yellowtail rockfish, English sole, Dover sole, Pacific hake, ling cod, and true cod were determined. A laboratory size fish separator was used; it separated, in minced form, the flesh from dressed fish. The results were compared with those using the fillets of the same species of fish. Machine separation yielded from 34.4% to 101.9% more edible flesh than that obtained from hand filleting. The portions prepared from frozen blocks of minced flesh had a lower moisture content and higher fat content than did portions prepared from frozen blocks of fillets. An evaluation panel preferred the portions prepared from blocks of frozen fillets over those prepared from minced flesh. However, the portions prepared from the minced flesh of the two rockfish species and three "cod-like" species were highly acceptable to the panel. The portions prepared from the minced flesh of the English sole and the Dover sole gave low acceptability scores; apparently, odor and flavor components associated with the skin carried through to the minced flesh. Addition of sodium tripolyphosphate to the 0.3% level did not improve the quality of the minced fish portions. The results indicate that frozen portions prepared from minced fish flesh are sufficiently acceptable to encourage market development of such products.
[5 tables, 7 references] FTP

2.43 (3.238)

Material	Use	Growth	
		E. coli	S. lactis
Cellulose acetate sprayed on parchment paper	Casing for barbeque loaf	+	+
	Casing for boneless smoked ham	+	+
Cellulose acetate	Casing for summer sausage	-	-
Cellulose acetate	Casing for cottage roll (pork butt)	+	+
Irradiated polyethylene	General wrapping	+	+
Laminated polyethylene	Wrapping steakettes	-	-
Polyethylene	Ham mold	-	-
Cellulose acetate	Casing for wieners	-	-
Cellulose acetate sprayed on parchment paper	Casing for bologna	+	+

[1 table, 3 references] SW

2.9 EFFECT OF CATIONS ON THE INTERACTION BETWEEN PARALYTIC SHELLFISH AND BUTTER CLAM (SAXIDOMUS GIGANTEUS) MELANIN

Price, R. J., and J. S. Lee (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1659-1661 (Nov. 1972)

Earlier work by the authors seemed to indicate an interaction between paralytic shellfish poison (PSP) and natural and synthetic melanin; this interaction was electrostatic in nature and was influenced by pH. Because the interaction between PSP and melanin may play an important role in the retention of the poison by butter clams, the present work was carried out to further characterize the nature of the PSP-melanin interaction. The binding of PSP by melanin in the presence of certain cations and the effect of cations on a PSP-melanin complex were examined. Such information should help define more clearly the electrostatic nature of the interaction and possibly reveal a method of desorbing bound PSP with salt solutions. A purified suspension of butter clam melanin was prepared and used; and purified powdered PSP was used.

The amount of PSP bound by melanin decreased by 68% in the presence of Al^{+++}; decreased by 62% with Ca^{++}; 57% with Ba^{++}; 17% with Na^{+}; and 15% with K^{+}. Salt solutions containing 0.01-M of Al^{+++}, Mg^{++}, Ca^{++}, Ba^{++}, Na^{+}, or K^{+} caused desorption of PSP bound to melanin by 54, 34, 28, 19, 11, and 4%, respectively. These results confirm the conclusion, arrived at from earlier experiments, that the PSP-melanin interaction is reversible and is electrostatic in nature.

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3.2383 FROZEN FISH PACKAGE

Vessie, A. M.; The Price Co. Ltd. (pat.)
U.S. Patent 3,690,923
Food Technology 26, No. 12, 76 (Dec. 1972)

This packaging folder is formed from a fibrous board coated on one side with a release coating permeable to air and on the other side with wax impervious to water and water vapor. FTP

MARINE FISHERIES ABSTRACTS VOL. 26 NO. 4 PAGE 15

3.231 FREEZING METHODS AS RELATED TO COST AND QUALITY

Rasmussen, Clyde L., and Robert L. Olson (Western Regional Research Laboratory, ARS, U.S. Dept. of Agriculture, Berkeley, CA 94710)
Food Technology 26, No. 12, 32, 34, 36-38, 41, 44, 47 (Dec. 1972)

The authors propose a formula for choosing a freezing system. The equation is $V = \frac{Cq}{C}$,
where V is the value of a freezing system, Cq is the quality a customer is willing to pay for the food product, and C is the lowest cost that will produce the desired quality. The best systems, thus, give the highest ratings for V. The authors analyze the formula and discuss its application, then they review some of the commercial freezing methods now in use.
[11 figures, 3 tables, 7 references] FTP

MARINE FISHERIES ABSTRACTS VOL. 26 NO. 4 PAGE 15

3.2340 LOBSTER PROCESSING

Moore, R. (pat.)
U.S. Patent 3,692,545
Food Technology 27, No. 1, 82 (Jan. 1973)

Lobsters are cooked in boiling salted water, cooled in fresh water at 45° F., then packaged in plastic bags. The packaged lobsters are then further cooled and frozen over a 2- to 12-hr. period. During the process, the lobsters are kept upside down. FTP

MARINE FISHERIES ABSTRACTS VOL. 26 NO. 4 PAGE 15

3.19 (2.43) MAKING ANTIMICROBIAL-SUPPLIED PLASTICS FROM AQUEOUS POLYURETHANE DISPERSIONS

Keberle, Wolfgang, and Brigitte Hamburger (Farbenfabriken Bayer A.-G.) (pat.)
German Offen. (Patent) 2,031,201 (Dec. 30, 1971)
Chemical Abstracts 76, No. 22, 128134h (May 29, 1972)

2.113 BASIC STUDIES ON THE ANTIFOULING BY ULTRASONIC WAVES FOR SHIP'S BOTTOM FOULING ORGANISMS. II. INFLUENCES OF ULTRASONIC WAVES ON THE LARVAE OF BARNACLES, BALANUS AMPHITRITE AND MUSSELS, MYTILUS EDULIS USED TOGETHER WITH POISONOUS SUBSTANCES

Suzuki, Hiroshi, and Kenjiro Konno (Fish. Navig. Lab., Tokyo, Japan)
Chemical Abstracts 76, No. 21, 122920q (May 22, 1972)

3.2340 (3.12) FISH PROCESSING

Aomori Prefecture (pat.)
Japanese Patent 27946/72
Food Technology 26, No. 12, 77 (Dec. 1972)

Finely divided fish meat is mixed with an alkali metal salt of orthophosphoric acid and a saccharide. This treatment helps prevent denaturation of the meat during frozen storage. FTP

3.12 USE OF POLYPHOSPHATES IN RED MEAT, POULTRY, AND SEAFOOD PROCESSING

Mahon, John H., K. Schlamb, and E. Brotsky (Calgon Corp., Pittsburgh, Pa.)
Chemical Abstracts 77, No. 15, 99696f (Oct. 9, 1972)

3.27 IMPROVEMENTS IN OR RELATING TO THAWING FROZEN FOODSTUFFS

National Research Development Corporation (A. C. Jason) (pat.)
British Patent 1,272,396
BFMIRA Abstracts 25, No. 6, Abstract No. 2341, 472 (June 1972)

A method and apparatus for thawing foodstuffs is described. The frozen foodstuffs are placed in an enclosed space in which the pressure is reduced. Water, at a temperature below that at which deterioration to the foodstuff by cooking would be caused, is then added. The water gives off vapour which condenses and thaws the frozen foodstuff. Reprinted

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2.9

The reversibility of the interaction in the presence of cations or hydrogen ions suggests a method for detoxifying clams. It may be possible to reduce PSP levels in toxic butter clams by holding live clams (or soaking minced clams) in solutions containing polyvalent cations; the cations would compete with the PSP for binding sites in the clam. FTP
[1 table, 9 references]

3.2340 (3.12) WHALE-MEAT PROCESSING

Nippon Suisan Kaisha Ltd. (pat.)
Japanese Patent 27033/72
Food Technology 26, No. 12, 77 (Dec. 1972)

Slices of whale meat are soaked in aqueous calcium hydroxide. The meat is then coated with a mixture of lactic acid and casein, then frozen. FTP

3.12 (6.54) BOILED FISH PASTE

Kyowa Hakko Kogyo Co. Ltd. (pat.)
Japanese Patent 31030/72
Food Technology 27, No. 1, 82 (Jan. 1973)

A water-oyster extract is incorporated into fish paste products as a preservative. FTP

3.5 A RAPID SALT-CURING TECHNIQUE

Anderson, Margaret L., and Joseph M. Mendelsohn (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Atlantic Fishery Products Technology Center, Emerson Ave., Gloucester, MA 01930)
Journal of Food Science 37, No. 4, 627-628 (July-Aug. 1972)

A quick laboratory scale method is described for salt curing ground fish. Skinless fillets are comminuted in a saturated salt solution containing enough excess salt to maintain saturation (the fish lose some fluid through syneresis). The liquid is then drained off and the residue is dried in a vacuum drum dryer or in moving air. The dried product is then vacuum packed in mylar pouches which are packed in cardboard cartons. For possible commercial production the authors recommend the use of a meat and bone separating machine.
[2 tables, 4 references] FTP

6.193 FISH SOLUBLES AS A PARTIAL SUBSTITUTE FOR MILK AND MILK BY-PRODUCTS IN LIQUID RATIONS FOR NEONATAL ANIMALS

Bauersfeld, Paul E., Jr., and Joseph H. Soares, Jr. (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Fishery Bulletin 70, No. 4, 1275-1279 (Oct. 1972)

This paper presents (1) a literature review of the use of fish protein in milk replacers for neonatal animals, (2) a list of criteria for proteins used in milk replacers, and (3) reports on three experiments in which menhaden fish solubles were partially substituted for milk protein in milk replacer rations.
Initial experiments reported here indicated that low levels (5%) of fish solubles produced equal calf growth when they replaced a similar amount of milk products in veal calf rations. However, the addition of 15% freeze-dried solubles at the expense of dried skim milk (DSM) did not produce satisfactory growth in young lambs. This was true even when lecithinated soy flour or delactosed whey powder supplemented part of the protein in the ration. Therefore, it is concluded that if significant quantities of fish protein are to be incorporated into milk replacer rations, protein of higher quality than that present in fish solubles must be used.
[3 tables, 8 references] Authors' abstract

4.5 SOME PECULIARITIES IN THE KINETICS OF THE INITIAL STAGE OF UNSATURATED FATTY ACID AUTOXIDATION. II. AUTOXIDATION RATES OF METHYL LINOLEATE AND METHYLOLEATE AND THEIR RATIO

Yanishlieva, N., and A. Popov
Nahrung 15, No. 4, 403-412 (1971) (In German, English summary)
BFMIRA Abstracts 25, No. 1, Abstract No. 69, 15 (Jan. 1972)

4.5 EFFECT OF THE OXIDATION OF OILS ON THE DETERIORATION OF FOODS. I. OXIDATION OF OILS IN A MODEL SYSTEM

Goto, Miyoko, Takehito Shirahama, Teishiro Nakagawa, and Kazuo Shibasaki (Tohoku Univ., Sendai, Japan)
Chemical Abstracts 77, No. 5, 32872s (July 31, 1972)

6.199 INFLUENCE OF DIETARY FISH MEAL ON EGG FATTY ACID COMPOSITION

Navarro, J. G., J. C. Saavedra, F. B. Borie, and M. M. Caiozzi (Departamento de Quimica Inorganica Analitica, Facultad de Quimica y Farmacia, Universidad de Chile, Casilla 233 Santiago, Chile)
Journal of the Science of Food and Agriculture 23, No. 11, 1287-1292 (Nov. 1972)

In this study, diets containing various levels of fish meal were fed to chickens to determine the effect of the fish meal on the fatty acid composition of the chicken eggs. Chilean hake fish meal containing 8.2% fat was used in these feeding tests with pullets. The fish meals were used in the diets at 10, 20, and 30 g.% levels; the fish oil content of the resulting rations was 0.82, 1.64, and 3.28%, respectively. The basal diet contained 0.5% fatty acid. The fatty acid distribution in the lipid fractions of the yolks of the eggs of pullets fed a basal diet (contained no fish meal or fish oil) and the test diet containing 20 g.% fish meal (or the equivalent of 1.64% fish oil) is shown in the table that follows. The changes produced in the fatty acid composition of the lipids of the eggs approach that found in the diets of the pullets. Apparently, the long-chain polyunsaturated fatty acids are deposited preferentially in the phospholipids (the highest levels were found in cephalin and lecithin).

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4.83 FISH OIL ALKYDS. III.

Bhatt, H. A., and P. V. Tagdiwala (Dep. Chem. Technol., Univ. Bombay, Bombay, India)
Chemical Abstracts 76, No. 24, 142449w (June 12, 1972)

6.199

Fatty acid	Amount of fatty acid in egg yolk lipids											
	Total fatty acids (%)		Neutral lipids (%)		Cephalin (%)		Lecithin (%)		Sphingomyelin (%)		Lysophosphatidylcholine (%)	
	A	B	A	B	A	B	A	B	A	B	A	B
16:0	29.9	27.6	26.1	26.3	45.3	21.9	27.9	37.1	52.0	23.7	20.6	24.4
16:1	5.3	4.3	5.0	4.7	4.6	2.2	tr	3.0	--	3.9	--	6.2
18:0	10.5	10.7	6.9	7.6	13.6	30.7	7.7	7.2	--	11.1	6.5	23.6
18:1	41.4	39.4	52.7	50.3	28.2	20.5	36.3	28.0	32.1	21.8	29.6	30.6
18:2	8.1	12.4	5.2	9.4	4.1	7.5	21.6	14.3	15.9	3.1	30.3	4.7
18:3ω3	0.9	1.3	0.8	1.2	0.9	0.4	6.5	0.5	--	1.6	3.2	1.2
20:2ω6	--	tr	tr	0.2	--	--	--	--	--	34.8	--	--
20:3ω6	--	tr	--	--	--	--	--	--	--	tr	--	1.2
20:4ω6	1.4	1.7	0.5	0.2	1.8	0.9	--	--	--	--	9.8	3.9
20:4ω3	0.1	1.5	0.4	tr	tr	8.3	tr	3.1	--	--	--	--
20:5ω3	tr	0.8	0.7	tr	--	0.2	tr	2.9	--	tr	--	--
24:0	--	tr	--	tr	--	0.4	--	tr	--	tr	--	--
22:4ω6	--	tr	--	tr	--	0.4	--	0.5	--	tr	--	1.2
22:5ω6	--	0.2	--	tr	--	0.9	tr	0.4	--	--	--	tr
22:5ω3	2.2	tr	--	tr	--	0.4	--	tr	--	--	--	tr
22:6ω3	tr	0.1	1.5	tr	tr	5.3	tr	3.0	--	--	--	3.1

Notes: A: Basal diet (without fish meal).
B: Diet containing 20% fish meal or the equivalent of 1.64% fish oil.
tr: Trace.

4.86 TANNERY FAT LIQUORING EMULSIONS

Pilc, Vladimir, Jan Binko, Mojmir Skrabal, Miroslav Ubry, Jaroslav Ondracek, and Josef Stephan (pat.)
Czechoslovakian Patent 139,310 (Dec. 15, 1970)
Chemical Abstracts 76, No. 18, 101238h (May 1, 1972)

4.86 NATURAL FATTY SUBSTANCES IN TANNING PASTE OF FLEXIBLE LEATHERS

Hollstein, M. (Zschimmer und Schwarz, Germany)
Chemical Abstracts 76, No. 14, 73785p (Apr. 3, 1972)

3.63 DRIED FISH PRODUCT

Hasegawa, K. (pat.)
Japanese Patent 22268/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Fresh fish flesh (low fat content) is reduced in an aqueous solution containing a sugar alcohol (such as sorbitol) and the aqueous mixture is spray dried. Reconstitution of the dried material yields a product which has a freshlike appearance.
FTP

6.190 COMPOSITION AND NUTRITIVE VALUE OF FISH MEALS

Buraczewska, Lucyna, Stanislaw Buraczewski, Stafania Lubaszewska, Barbara Pastuszewska, and Teresa Zebrowska (Inst. Anim. Physiol. Nutr., Jablonna/Warsaw, Poland)
Chemical Abstracts 77, No. 15, 99995c (Oct. 9, 1972)

6.199 THIOPEPTIN, A NEW FEED-ADDITIVE ANTIBIOTIC. BIOLOGICAL STUDIES AND FIELD TRIALS

Mine, K., N. Miyairi, N. Takano, S. Mori, and N. Watanabe (Fujisawa Pharm. Co., Ltd., Osaka, Japan)
Chemical Abstracts 77, No. 15, 97308g (Oct. 9, 1972)

6.3 PAST, PRESENT AND FUTURE OF THE SEAWEED INDUSTRY

Druehl, Louis D. (Dept. of Biological Sciences, Simon Fraser University, Burnaby, British Columbia, Canada)
Underwater Journal and Information Bulletin 4, No. 5, 182-191 (Oct. 1972)

Man has used seaweed for as long as 5,000 years. The most significant products of seaweed are the phycocolloids agar and algin. Recent studies indicate that other seaweed products have a great potential as food and fodder supplements, and their unique medicinal properties have been discovered. There is a trend toward mariculture which is complicated by pollution, pests, and disease.

Seaweeds are macroscopic algae attached to the grounds of intertidal and shallow waters of the world's seas. Their vertical growth is limited by available light, and economically important species lie in depths of less than 40 m. Examples of algae classification follow: Chlorophyta (green algae) division--Ulva (sea lettuce); Phaeophyta (brown algae) division--Macrocystis (giant kelp); and Rhodophyta (red algae) division--Chondrus (Irish moss, carragheen).

The industrial use of seaweed began during the 17th century in Western Europe with the production of soda and potash from burned brown algae--species of Laminariales and Fucales. In 1812, iodine was found in kelp ash and the kelp industry was the major source of this element for many years. Phycocolloids began to be recovered from seaweed late in the 19th century. These colloids are mucilaginous polysaccharides and constitute 10 to 65% of the dry weight. Agar, algin, and carrageenan are the phycocolloids of greatest importance and all are used in foods and drugs.

Oriental peoples make the most of seaweed as food; over 100 species are eaten by Chinese, Japanese, and Hawaiians. The thin-bladed red algae Porphyra is

 (over)

6.35 A PRELIMINARY FEASIBILITY STUDY OF IRISH MOSS HARVESTING SYSTEMS

Patell, James M.
Report No. MITSG 72-14, 64 pp. (June 30, 1972) (Sea Grant Office, Massachusetts Institute of Technology, Cambridge, MA 02139)

Irish moss (Chondrus crispus) is one of the red algae (Rhodophyceae). The plant is a small seaweed, 2 to 15 in. high, sturdy and thick in growth with multiple branches resembling parsley. A holdfast secures the plant to rocky substrates. It grows from just above low-water level down to a depth of 20 to 30 ft. C. crispus is found along the coast from Newfoundland to New Jersey, from Norway to the coast of North Africa, and the coast of the Phillipine Islands. Irish moss is the chief source of carrageenan which is used in the food, cosmetic, pharmaceutical, and other industries as a stabilizer, gelling agent, and viscosity control agent.

In the United States the major suppliers of Irish moss are located in Maine and Massachusetts. Canadian waters on the coasts of Nova Scotia, Prince Edward Island, and the Northumberland Strait support large beds of the plant. All Irish moss harvested in the United States is sold to one company based in Rockland, Me., and American sources account for only 5 to 10% of the Irish moss purchased by the company. The company owns a mechanical drying plant on Orr's Island off the Maine coast but has not operated it in 1971 or 1972. The only other mechanized drying plant in the United States is operated by another supplier of Irish moss in Kingston, Mass. This company operates an Irish moss harvesting system of its own for the drier. Thus price offered by the Rockland, Me., company is settled since there is no competitive bidding. The Food and Agricultural Organization of the

 (over)

6.32 (8.53) THE BIOCHEMICAL ANALYSIS OF SOME ESTUARINE PHYTOPLANKTON SPECIES. I. FATTY ACID COMPOSITION

De Mort, Carole L., Robert Lowry, Ian Tinsley, and H. K. Phinney (Dept. of Botany and Plant Pathology and Dept. of Agricultural Chemistry, Oregon State University, Corvallis, OR 97331)
Journal of Phycology 8, No. 3, 211-216 (Sept. 1972)

This paper reports the fatty acid composition of 10 species of estuarine phytoplankton as determined by gas-liquid chromatography. Nine of the ten species were from Yaquina Bay, Oreg., and were common components of the phytoplankton of the bay. The nine species were Tetraselmis suecia, Chlorella protophila, Chlamydomonas palla, Cryptomonas salina, Prymnesium parvum, Cylindropyxis sp., Cylindrotheca gracilis, Navicula abscondita, and Navicula biskanteri. The tenth species Isochrysis galbana was from the Culture Collection of Algae at Indiana University. The organisms consisted of three species of Chlorophyta, one species of Cryptophyta, and six species of Chrysophyta.

Twenty-eight fatty acids were identified in the 10 species of phytoplankton. The fatty acids common to all 10 species were 14:0, 16:0, 16:1, 18:0, 18:1, and 18:2. The Chlorophyta had very low amounts of C_{18} acids and high proportion of $C_{20:5}$ acids. All the phytoplankton species had a high proportion of palmitic acid (16:0).
[5 tables, 29 references] FTP

6.50 FISH PROTEIN SOLUBILIZATION

Faith, W. T., Jr., R. B. Steigerwalt, E. A. Robbins; Rohm and Haas Co. (pat.)
U.S. Patent 3,697,285
Food Technology 27, No. 1, 82 (Jan. 1973)

Alkaline bacterial protease is used to effect solubilization and extraction of protein from fish, fish products, or fish parts. FTP

6.50 FISH TASTE IMPROVEMENT

Astra Nutrition AB (pat.)
German Patent 1,692,393
Food Technology 26, No. 12, 77 (Dec. 1972)

The flavor of fish meals is improved by using a butanol extraction process. FTP

6.39 SEAWEEDS AS MANURE. III. FIELD MANURIAL TRIALS ON PENNISETUM TYPHOIDS S.H. (PEARL MILLET) AND ARACHIS HYPOGEA (GROUNDNUT)

Bokil, K. K., V. C. Mehta, and D. S. Datar (Central Salt and Marine Chemicals Research Institute, Bhavnagar, India)
Botanica Marina 15, No. 3, 148-150 (Sept. 1972)

In another report, estimates were given that 10,000 tons of dry harvestable seaweeds are available on the semi-arid coastal area of Saurashtra and Kutch region of Gujarat State, India. Experiments were performed to determine the usefulness of seaweed as an auxiliary fertilizer without detriment to pearl millet and groundnut crops. The seaweeds consisted of brown seaweeds and drift seaweeds which were a mixture of red, brown, and green seaweeds. The experiments were conducted over a 3-year period, 1966-1968.

In tests on pearl millet, the effects of nitrogen in the form of ammonium sulfate, seaweed manure, and farmyard manure were studied at two levels: 5 kg. and 10 kg. N per acre. In tests on groundnut, nitrogen and phosphoric acid were applied at the level of 5 kg. N and 10 kg. P_2O_5 per acre. The nitrogen was supplied in the same forms used on pearl millet.

Results of the tests indicated that for pearl millet, although the yield was not altered, seaweed faborably influenced the quality of its grains and fodder in that nitrogen and phosphorus content increased. Results with groundnut crops were similar.

The authors concluded that seaweed improves the quality of crops, and in some cases, increases the yield. In addition, seaweed enhances the utilization of inorganic fertilizers.
[3 tables, 17 references] SW

6.37 ALGAE AND LITHOTROPHIC BACTERIA AS FOOD SOURCES

Vincent, W. A.
Symposia Soc. Gen. Microbiol. No. 21; Microbes Biol. Productivity, pp. 47-76 (1971)
BFMIRA Abstracts 25, No. 6, Abstract No. 2023, 410 (June 1972)

6.37 WORKING BASIS FOR USING MICROALGAE IN FOOD AND DIET

Soeder, C. J., H. Mueller-Wecker, W. Fabst, and H. Kraut (Kohlenstoffbiol. Forschungsstn.-e.V., Dortmund, Germany)
Chemical Abstracts 77, No. 15, 99932c (Oct. 9, 1972)

6.3

the most popular in Japan; in 1970, 10,981 tons were harvested with a market value of $153 million. Seaweeds are potentially important sources of carbohydrate, proteins, vitamins, and micronutrients, but their availability for human nutrition is not known. As a fodder ingredient, seaweed is reported to be high in nutritional values. Norway is a leading nation in research in this field. Fifty thousand tons of seaweed is produced annually for meal in Norway. The seasonal chemical uniformity of one seaweed used for meal allows a year-round harvest. It requires fortification with calcium, phosphorus, and magnesium.

Reports indicate that seaweed products act as vermifuges, anticoagulants of blood, and depressors of blood cholesterol levels. Antibacterial and antiviral activity against human and animal diseases have also been reported. As fertilizers, seaweeds are reported to be suppliers of trace elements and complexes which act as chelators. They are said to cause resistance to plant diseases and extreme temperatures; they induce fruit setting and retard senescence. Their application on alkaline and calcareous soils is reported to increase availability of nitrogen, phosphorus, potassium, and iron. Great Britain is a major producer of seaweed fertilizers.

Japan leads the world in total amount of seaweed harvested annually: 245,000 metric tons of brown algae in 1969. In contrast, Mexico's harvest was 26,700, and Scotland's was 24,400. Furthermore, Japan's harvest of red algae in metric tons was 134,000; Canada's was 43,900; and Argentina's was 19,400. Harvesting seaweed is one of the most difficult aspects of the industry. Most of the harvesting is on a cottage industry basis. Some mechanization has been introduced. Ultimately the future uses of seaweeds will be based on their chemical composition. Phycocolloids, antibiotics, food, fertilizer, and feeds are areas for continued development.
[10 figures, 6 tables, 35 references] SW

6.35

United Nations listed in the following table moss landings and prices for 7 yr. with information on Canadian landings also.

Landings of Irish moss (lb.)

Year	United States	Canada	Price per lb. (wet)
1964	4,400,000	28,200,000	1.7 ¢
1965	4,620,000	39,240,000	1.7
1966	4,180,000	51,140,000	1.8
1867	5,060,000	79,340,000	1.75
1968	7,280,000	87,060,000	3.0
1969	5,060,000	96,760,000	3.0
1970	4,000,000	105,800,000	3.0

Estimates of the potential harvest from the Maine and Massachusetts coast indicated that it could be increased by a factor of two or more. The low price of wet weight harvested moss is the limiting factor in developing a harvesting system. In addition, uncertainty of price level plus uncertainty of possible buyers are other important factors. The harvest requires workers for only 6 months of the year. To attract a labor force this short work period would require compensating factors. The bottom topography where the moss grows is rough and requires rugged apparatus. Working in shallow water exposes all systems to wave actions, and the probability of damage is high.

The author concludes that the feasibility of developing and operating a mechanized Irish moss harvesting system for use in the United States is not economically justifiable at this time. A harvester has already been constructed and refined; however, operation of the entire system at the market price for Irish moss is prohibitive. [10 figures, 2 tables, 45 references, 2 appendices] SW

6.54 (0.6) APPROACHES TO THE UTILIZATION OF FISH FOR THE PREPARATION OF PROTEIN ISOLATES. ISOLATION AND PROPERTIES OF MYOFIBRILLAR AND SARCOPLASMIC FISH PROTEINS

Spinelli, John, Barbara Koury, and Ruth Miller (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Pacific Fishery Products Center, Seattle, WA 98102)
Journal of Food Science 37, No. 4, 599-603 (July-Aug. 1972)

This work relates to the preparation of functional proteins from fish. The tissue of the Pacific ocean rockfish was separated into myofibrillar, sarcoplasmic, and nonprotein fractions and the physical, chemical, and organoleptic properties of each fraction were examined before and after they were dried.

The sarcoplasmic proteins contain a major portion of the substances that adversely affect the organoleptic stability of the proteins. They are severely denaturated by freeze drying. Myofibrillar proteins showed reduced solubility in neutral 5% salt (NaCl) from 70-80% to about 15% after freeze drying. They deteriorate (from the organoleptic standpoint) gradually even when treated with antioxidants. When the myofibrillar protein is extracted with polar organic solvents, organoleptic deterioration is prevented, but the functional properties of the protein are destroyed. The salt-soluble characteristics of the myofibrillar proteins are preserved for a short period of time when the proteins are co-dried with carbohydrates (includes sucrose, glucose, fructose, corn starch, and corn syrup solids).
[8 figures, 1 table, 23 references] FTP

6.54 DEVELOPMENT OF A PROCESS FOR PREPARING A FISH PROTEIN CONCENTRATE WITH REHYDRATION AND EMULSIFYING CAPACITIES

Cobb, Bryant F., III, and Kamaluddin Hyder (Dept. of Animal Science, Texas A&M University, College Station, TX 77843)
Journal of Food Science 37, No. 5, 743-750 (Sept.-Oct. 1972)

An ideal economic process for the manufacture of fish protein concentrate (FPC) would produce a product that: (1) possesses nutritive values similar to the fresh fish muscle, (2) regains moisture to the same level as that in the fish muscel, (3) is bacteriologically sterile, (4) is odorless and tasteless, or possesses a pleasing odor and taste, (5) is stable under atmospheric conditions, and (6) contains no toxic residues. Furthermore, the process might result in the recovery of a high-grade oil. This study was carried out in an attempt to develop such an FPC process and the present article reports the results.

Atlantic croaker Micropogon undulatus were dressed and cleaned. Salt (NaCl) was added to the fish and the mixture was ground. The pH of the mixture was adjusted to 2.5 using 1N HCl, a mixture of equal volumes of ethanol and hexane was added, and the entire mixture was heated at reflux temperature of the solvent (about 70° C.). The hexane was decanted and the ethanol was removed by filtration or centrifugation. The extraction process was repeated from two to four times. The protein concentrate was dried in air or vacuum-dried at 70° C. in a desiccator. The pH was adjusted to 2.5 to prevent protein-protein interaction. Salt was added to control gel formation.

The resulting FPC had an amino-acid spectrum similar to that of the muscle of the fresh fish, and it formed gels when added to water. The rehydrated material
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6.54 (0.6) APPROACHES TO THE UTILIZATION OF FISH FOR THE PREPARATION OF PROTEIN ISOLATES. ENZYMIC MODIFICATIONS OF MYOFIBRILLAR FISH PROTEINS

Spinelli, John, Barbara Koury, and Ruth Miller (U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Pacific Fishery Products Center, Seattle, WA 98102)
Journal of Food Science 37, No. 4, 604-608 (July-Aug. 1972)

The feasibility of modifying myofibrillar fish proteins by partially hydrolyzing them with proteolytic enzymes was examined. The object was to develop a basic method for the isolation and processing of partially hydrolyzed proteins into functional and organoleptically stable products. The myofibrillar protein was prepared from fillets of Pacific ocean rockfish. The enzyme Rhozyme P-11 was used to partially hydrolyze the myofibrillar protein. The protein was complexed with sodium hexametaphosphate, and the lipids were extracted from the protein-phosphate complex with azeotropic isopropanol. The dried isolates were practically free of flavor and odor, and they were able to emulsify over 200 times their weight of oil.
[8 figures, 1 table, 15 references] FTP

7.0 MOTION SENSITIVITY OF FLAME IONIZATION DETECTORS

Gularte, Ronald Carl (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Technical Report WHOI-72-52, 86 pp. (July 1972) (Prepared for NOAA office of Sea Grant Program) Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

A portable gas chromatography, using a single flame ionization detector, was constructed. The unit was tested for response to surge, sway and heave accelerations up to 0.3g. Also the detector's response was studied for roll and pitch up to 25 degrees with periods ranging from 3 to 20 seconds. The effect on the detector's response of variation in hydrocarbon concentrations in the parts per million range was investigated and response increased with increasing concentration. Samples containing 1, 10, 100, 1,000, and 10,000 parts per million dodecane were analyzed, and under the higher accelerations trace distortion was evident for concentrations below 10 parts per million. Stationary isothermal chromatograms of a normal alkane sample (nC_6 - nC_{32}) were compared with those obtained under the various test conditions and no detectable difference in peak area (which represented approximately 1 microgram of the particular hydrocarbon) or retention time was evident. The limits of detection for the Aerograph detector were found to be 21.8×10^{-6} mg/sec for a 30 degree roll, 29.1×10^{-6} mg/sec for 20 degree pitching and 21.8×10^{-6} mg/sec for a 0.6g heave acceleration. For the range of translational and angular accelerations that might be expected on a platform at sea, it was found that medium resolution gas chromatography using a flame ionization detector can be conducted, but in the trace analysis region, trace distortion can be expected.
[30 figures, 3 tables, 20 references] Author's abstract

6.55 APPLICATION OF L-LYSINE SUPPLEMENTS TO MIXTURES WITH ANIMAL MEALS IN FATTENING PIGS. I. GROWTH, FEED USE AND CARCASS VALUE

Navratil, B., and A. Vlcek (Vyzk. Ustaf Vyzivy Zvirat, Pohorelice, Czechoslovakia)
Chemical Abstracts 76, No. 25, 152421v (June 19, 1972)

6.55 APPLICATION OF L-LYSINE SUPPLEMENTS TO MIXTURES WITH ANIMAL MEALS IN FATTENING PIGS. II. NITROGEN BALANCE, DIGESTIBILITY OF NUTRIENTS AND ENERGY

Navratil, B., and A. Vlcek (Vyzk. Ustav Vyzivy Zvirat, Pohorelice, Czechoslovakia)
Chemical Abstracts 76, No. 25, 152422w (June 19, 1972)

7.45 FLUOROMETRIC METHOD FOR DETERMINING NANOGRAM QUANTITIES OF NITRITE ION

Dombrowski, Lawrence J., and Edward J. Pratt (Sterling-Winthrop Research Institute, Rensselaer, NY 12144)
Analytical Chemistry 44, No. 14, 2268-2272 (Dec. 1972)

This paper describes the development of a highly sensitive fluorometric method for the determination of nitrite ion. The procedure involves the diazotization of p-chloroaniline and coupling with 2,6-diaminopyridine; the resulting azo product is further derivatized with ammoniacal cupric sulfate to produce a highly fluorescent triazole compound (excitation maximum of 360 nm.; fluorescence maximum of 430 nm.). The intensity of the fluorescence varies linearly with the concentration of nitrite. By this procedure, nitrite ion can be detected to a level of 2 nanograms per milliliter using a 10-ml. sample. At this level, the precision is 7%.
[5 figures, 4 tables, 16 references]

FTP

6.55 FISH OFFAL AS A VALUABLE PROTEIN FEED FOR POULTRY

Alishejkhov, A. M., N. A. Osmanova, and M. Sh. Aliev (U.S.S.R.)
Chemical Abstracts 77, No. 5, 33273j (July 31, 1972)

6.54 EFFECT OF THE DURATION AND METHOD OF STORAGE ON CHANGES IN THE COMPOSITION AND QUALITY OF FISH, MEAT, AND BLOOD FLOURS

Pesut, Milovan, Tajana Crnojevic, Ivan Balzer, and Teodor Pozezanac (Fac. Agric., Univ. Zagreb, Zagreb, Yugoslavia)
Chemical Abstracts 77, No. 5, 32899f (July 31, 1972)

6.4 FISH EXTRACTS IN FOOD INDUSTRY

Watanabe, Yasuo (Riken Vitamin Oil Co., Ltd., Tokyo, Japan)
Chemical Abstracts 77, No. 13, 86684a (Sept. 25, 1972)

6.54

formed emulsions when blended with vegetable oils. The emulsifying and rehydration capacities of the FPC were dependent upon the pH; the minimum uptake of water and oil was in the pH range of 5 to 8.
[9 figures, 4 tables, 28 references]

FTP

6.55 NUTRITIONAL MYOPATHY DUE TO VITAMIN E DEFICIENCY IN CALVES FED FISH PROTEIN CONCENTRATE AS THE SOLE SOURCE OF PROTEIN

Michel, R. L., D. D. Makdani, J. T. Huber, and A. E. Sculthorpe (Pathol., Michigan State Univ., East Lansing, Mich.)
Chemical Abstracts 77, No. 5, 33210m (July 31, 1972)

0.35 (0.38) DETOXIFICATION OF FOREIGN ORGANIC COMPOUNDS BY THE QUAHAUG MERCENARIA MERCENARIA

Carlson, Gary P. (Dept. of Pharmacology and Toxicology, College of Pharmacy, University of Rhode Island, Kingston, RI 02881)
Comparative Biochemistry and Physiology 43B, 295-302 (1972)

The metabolic pathways in detoxification of foreign organic compounds in quahog should be understood because this clam is used for food.

Experiments were performed to determine the routes of detoxification available to the quahog. Separate homogenates were prepared of quahog hepatopancreas, mantle, foot, and gills. Soluble, and microsomal fractions were obtained in 1.5% KCl with ultracentrifugation. The detoxification of the organophosphate insecticide O-ethyl O-p-nitrophenyl phenylphosphonothioate (EPN) was ascertained by measuring the end product, p-nitrophenol. This product was measured in the O-demethlation of p-nitroanisole. The N-demethylation of aminopyrine was determined by measuring the formaldehyde formed. The ability to oxidize hexobarbital was determined by measuring the amount of hexobarbital lost. The reduction of p-nitrobenzoic acid to p-aminobenzoic acid (PABA) was determined by measuring the amount of PABA colorimetrically.

Results of the tests indicated that no metabolism of EPN or O-demethylation of p-nitroanisole occurred using either whole liver homogenates, 9,000 g ultracentrifuge supernatant fractions, or microsomal fractions of the hepatopancreas. Whole homogenates of mantle, foot, or gill were also inactive with these compounds.

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7.8 (1.84) EVALUATION OF SCALLOP MEAT QUALITY BY THE RESAZURIN REDUCTION TECHNIQUE

Webb, N. B., F. B. Thomas, F. F. Busta, and L. S. Kerr (Dept. of Food Science, North Carolina State University, Raleigh, NC 27607)
Journal of Milk and Food Technology 35, No. 11, 664-668 (Nov. 1972)

A characteristic of the shellfish industry is the large number of relatively small operations. In such establishments objective methods that are rapid, inexpensive, and simple for determining the organoleptic and bacteriological qualities of shellfish would be valuable. The resazurin reduction technique has been used as a rapid, objective test of milk quality by the dairy industry (A.P.H.A., Standard Methods for the Examination of Dairy Products, 12th ed., American Public Health Association, New York, 1967, p. 136.) [In the presence of the number of mastitis organisms in milk that is 24 hr. old, a blue dyestuff, "Diazoresorcinol" as the indicator in the resazurin test is reduced to red resorufin and, eventually, to colorless dihydroresorufin.] Results of preliminary work by the authors indicated that scallop meat spoilage rate and resazurin reduction time were fairly well correlated.

In further tests to determine the applicability of the resazurin test to the shelf-life quality of scallop meat, samples were analyzed at selected intervals for total bacterial counts, resazurin reduction time, and aroma (sensory evaluation). The resazurin method of the American Public Health Association was used with slight modifications, and the Munsell system of color notation was used to determine the end point.

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7.593 DETERMINATION OF VOLATILE AMINES BY GAS CHROMATOGRAPHY: APPLICATION TO FISH

Sanchez, L. G., F. Valverde, and B. R. Pinero
Infcion Quim. analit. pura apl. Ind. 25, No. 6, 193-202 (1971) (In Spanish)
BFMIRA Abstracts 25, No. 12, Abstract No. 4176, 477 (Dec. 1972)

A method for determining the volatile amines present in cod is described and 27 amines are reported. A procedure for determining trimethylamine by referring its peak height to a calibration graph is given. R.J.D.S. Reprinted

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7.595 THE THIN-LAYER CHROMATOGRAPHIC DETECTION OF FOOD PRESERVATIVES

Lemieszek-Chodorowska, K., and A. Synerski,
Roczn. panst. Zakl. Hig. 22, No. 4, 421-426 (1971) (In Polish)
BFMIRA Abstracts 25, No. 12, Abstract No. 4214, 485 (Dec. 1972)

The technique described can be used to detect down to 12.5 μg. of benzoic acid, 5 μg of salicylic acid, the propyl, ethyl and methyl esters of p-hydroxybenzoic acid and 2.5 μg of sorbic acid. Detailed procedures for various foods are given. Reprinted

7.86 (0.5) POLYELECTROLYTE FLOCCULATION AS AN AID TO RECOVERY OF ENTEROVIRUSES FROM OYSTERS

Kostenbader, K. D., Jr., and D. O. Cliver (Food Research Institute and Dept. of Bacteriology, University of Wisconsin, Madison, WI 53706)
Applied Microbiology 24, No. 4, 540-543 (Oct. 1972)

The procedures used to detect enteroviruses in oysters are either extremely laborious or relatively insensitive. Apparently, the oyster suspensions are toxic to the tissue cultures used to demonstrate these viruses; the suspensions must be treated intensively to reduce the toxicity or they must be diluted to minimize toxic effects. In previous work polyelectrolyte compounds (flocculation products) were tested for recovery of enteroviruses from experimentally contaminated ground beef and contaminated water. Thus, the present researchers carried out tests with two commercially available polyelectrolytes for use in flocculating solids in the recovery of enterovirus from two species of inoculated oysters. One of the two polyelectrolytes, Cat-Floc (a polydimethyldiallyl ammonium chloride; molecular weight of about 500,000), was found to be suitable.

Gulf Coast oysters, Crassostrea virginica, from Galveston Bay, United States, and English oysters, Ostrea edulis from the Tamar River, Cornwall, England, were used. The virus was injected into the digestive tract or pipetted onto the surface of the oysters; no differences in the results were noted attributable to the method of inoculation. The inoculated oyster (about 20 g.) was minced with scissors and then stirred with 100 ml. of glycine-NaOH buffer for 1 min. Two ml. of a stock solution (about 1%, w/v) of the polyelectrolyte was added and the mixture

(over)

7.599 GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE NITROSAMINES IN FOODS

Essigmann, John M., and Phillip Issenberg (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Food Science 37, No. 5, 684-688 (Sept.-Oct. 1972)

Methods are given for the determination of certain volatile nitrosamines in foods. The nitrosamines were removed from foods using a distillation-extraction apparatus [S. T. Likens and G. B. Nickerson, Proc. Am. Soc. Brewing Chemists, p. 5 (1964)]; 60% of added dimethylnitrosamine and 70% of added diethylnitrosamine were recovered from 10 ng./gram aqueous solutions. Potential interferences in the gas chromatographic (GC) analysis were removed from the extract by an acid extraction step and by liquid column chromatography. Using a GC solvent stripping technique, dilute solutions of nitrosamines were analyzed directly. Detection of nitrosamines was accomplished with a Coulson electrolytic conductivity detector operated in the pyrolytic mode and with a flame ionization detector. The authors compared the sensitivities of these detectors for selected volatile alkyl and heterocyclic nitrosamines of potential significance in foods. They demonstrated the specificity of the Coulson detector for analysis of extracts of smoked fish and some processed meats. Unambiguous confirmation of identity of chromatographic peaks tentatively identified as nitrosamines is necessary. Cleanup of the concentrates from foods (consisting of extraction, liquid chromatography, or preparative GC) might be required depending upon the nature of the materials present. Apparently, a standard analytical method for all volatile nitrosamines and all foods is not yet available.
[7 figures, 1 table, 11 references]
FTP

7.86 (0.5)

continuously stirred for 15 min. The floc was allowed to settle for 5 min. The entire mixture was poured through Miracloth (a commercial product) reinforced with cheesecloth, and the residual fluid was expressed by use of the plunger. The filtrate was then filtered in a Büchner funnel with vacuum; the funnel contained successive layers of Miracloth, cheesecloth, glass-fiber prefilter, and a 0.45-μm. porosity membrane filter. The preparation could be further concentrated by ultracentrifugation.

The polyelectrolyte flocculant promoted cohesion of the oyster solids and aided separation of the virus. Recovery of experimentally inoculated virus was from 80 to 100%. Quite likely, other polyelectrolytes would serve the same purpose.
[3 tables, 14 references]
FTP

0.35 (0.38)

Aminopyrine was not metabolized to formaldehyde via N-demethylation after incubation with ultracentrifuge soluble fraction or microsomes; changes in pH and salinity had no effect. Neither the whole homogenate nor 9,000 g supernatant fraction of hepatopancreas could metabolize hexobarbital.

Nitroreductase activity was present in the hepatopancreas of the quahog. It was able to reduce p-nitrobenzoic acid to PABA. The reaction was maximal at 35° to 45° C. and pH 6.0; it was stimulated by flavin mononucleotide and inhibited by potassium cyanide. Nitroreductase activity was also found in mantle, gill, foot, and gonadal tissue. It was found that three times as much activity of the enzyme was present in the 105,000 g soluble fractions as in the microsomal fractions.
[7 tables, 18 references]
SW

7.8 (1.84)

The results of the tests showed that bacterial counts and panel aroma scores correlated, but neither correlated with the resazurin method. Although there was little correlation between the resazurin method and the other two tests the authors believe that what little agreement existed was sufficient for in-plant testing of fresh scallop meat quality. However, on the basis of these studies they recommend that a reduction time of greater than 3 hr. be used.
[5 figures, 14 references]
SW

7.8 AROMIZATION [sic] OF CANNED FISH AND APPRAISAL OF THEM BY ANALYZING THE FOOD SMELLS

Pekhov, A. V., G. I. Kas'yanov, V. Ya. Senich, B. V. Artem'ev, and N. E. Arkhipteev (Krasnodar. NIIPP, Krasnodar, U.S.S.R.)
Chemical Abstracts 76, No. 25, 152099w (June 19, 1972)

7.87 DETECTION OF FROZEN FISH DETERIORATION BY AN ULTRAVIOLET SPECTROPHOTOMETRIC METHOD

Danopoulos, A. A., and V. L. Ninni (Athens Graduate School of Economics and Business Science, Chemistry and Technology Laboratory, 76 Patission Street, Athens, 104, Greece)
Journal of Food Science 37, No. 5, 649-651 (Sept.-Oct. 1972)

The ultraviolet light absorption of the oil from the fish Pagelus erythrinus was determined. The fish was stored at -20° C. for 6 months. The oil was extracted from the fish at periodical intervals of storage and the ultraviolet absorption of the oil was determined. Practically no change in ultraviolet absorption of the oil takes place from about 90 to 120 days of storage of the frozen fish, but afterwards ultraviolet absorption increases sharply. The fish finally become rancid in flavor and odor. The induction period in the oxidation of the oil of the frozen fish is clearly demonstrated by its ultraviolet absorption at 232 or 268 nm. The authors suggest that the ultraviolet absorption technique offers a reasonably satisfactory measure of the extent of oxidation of tissue oil in frozen fish.
[3 figures, 1 table, 10 references] FTP

8. TABLES OF FOOD COMPOSITION: AVAILABILITY, USES, AND LIMITATIONS

Murphy, Elizabeth W., Bernice K. Watt (Nutrient Data Research Center, Consumer and Food Economics Institute, U.S. Dept. of Agriculture, Federal Center Building, Hyattsville, MD 20782), and Robert L. Rizek
Food Technology 27, No. 1, 40,42-43, 45-48, 50-51 (Jan. 1973)

This paper contains a description of tables of food composition and related publications available from the U.S. Department of Agriculture and how to obtain them. Also, an outline of the work currently being emphasized by the Nutrient Data Research Center is presented and misunderstandings regarding data in the Center's current publications are discussed. Tables of food composition properly used can be an invaluable tool; the authors hope that the information presented in this article will help food scientists increase their understanding of and widen their use of food composition tables.
[5 tables, 5 references] FTP

8.51 (3.249) LEVEL OF FREE AMINO ACIDS IN NATURAL PRESERVES FROM PACIFIC OCEAN MACKEREL

Nasedkina, E. A., and Yu. I. Kas'yanenko (Tikhookean. Nauchno-Issled. Inst. Rybn. Khoz. Okeanol., Vladivostok, U.S.S.R.)
Chemical Abstracts 76, No. 9, 44782e (Feb. 28, 1972)

8.51 (3.5) CHANGE IN FISH MUSCLE TISSUE PROTEINS DURING PREPARATION FOR PICKLING

Lenova, A. P. (U.S.S.R.)
Chemical Abstracts 77, No. 7, 46906t (Aug. 14, 1972)

9.11 (0.35) NITROGEN FIXATION BY A BLUE-GREEN EPIPHYTE ON PELAGIC SARGASSUM

Carpenter, Edward J. (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Science 178, No. 4066, 1207-1209 (Dec. 15, 1972)

Biological nitrogen fixation undoubtedly must play a major role in the nitrogen cycle of the ocean; however, practically nothing is known of in situ bacterial nitrogen fixation in the open ocean, and only one algal genus Oscillatoria (Trichodesmium) has been reported to fix atmospheric nitrogen. This paper describes the first in situ measurements of nitrogen fixation by a heterocyst-bearing blue-green algae from the open ocean. [Heterocysts are enlarged cells that permit nitrogen fixation under aerobic conditions.] In May and July 1972, nitrogen fixation by Dichothrix fucicola (an epiphyte on pelagic Sargassum) was measured in the western Sargasso Sea and the Gulf Stream. Apparently this represents the first report of nitrogen fixation by a heterocyst-bearing blue-green alga in the open ocean, and also the first observation of nitrogen fixation in the genus Dichothrix. Cellular carbon to nitrogen ratios of the Dichothrix samples suggested that the alga was nitrogen-starved. The author suggests that nitrogen fixation may possibly affect the pelagic Sargassum community (comprising over 100 organisms) by extracellular release of combined nitrogen and uptake by Sargassum or phytoplankton (or by the grazing of herbivorous organisms on the Dichothrix). The enrichment of surface sea water with combined nitrogen from nitrogen fixation may be pronounced in dense aggregations of Sargassum (such as rafts or windrows).
[2 tables, 17 references] FTP

8.0 STRUCTURE OF SOME BIVALVE SHELL CARBONATES PREPARED BY ION-BEAM THINNING. A COMPARISON STUDY

Towe, Kenneth M., and George R. Thompson (Dep. Paleobiol., Smithsonian Inst., Washington, D.C.)
Chemical Abstracts 77, No. 15, 98517m (Oct. 9, 1972)

8.0 STUDIES ON CHEMICAL COMPOSITION OF CUTTLEFISH (SEPIA SP.) MEAT AS RELATED TO ITS NUTRITIVE VALUE

Badrowski, T. et al.
Acta Ichthyologica et Piscatoria 1, 145-158 (1970)
BFMIRA Abstracts 25, No. 6, Abstract No. 2028, 411 (June 1972)

The proximate analysis and yield of cuttlefish is given. L.P. Reprinted

7.779 DETERMINATION OF THE PEROXIDE VALUE OF LEAN ANIMAL TISSUES

Valencia, M. E., and J. C. Sanahuja
An. Bromat. 23, No. 2, 217-224 (1971) (In Spanish)
BFMIRA Abstracts 25, No. 12, Abstract No. 4207, 483 (Dec. 1972)

7.9 (9.19)(6.30) CULTIVATION OF GREEN ALGAE AND THEIR USE IN TOXICOLOGICAL EXPERIMENTS

Khobot'ev, V. G., and V. I. Kapkov (Mosk. Gos. Univ., Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57193j (Aug. 28, 1972)

9.11 (8.53) FATTY ACIDS IN SURFACE PARTICULATE MATTER FROM THE NORTH ATLANTIC

Schultz, David M., and James G. Quinn (Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881)
Journal of the Fisheries Research Board of Canada 29, No. 10, 1482-1486 (Oct.1972)

Earlier work has shown that the fatty acid composition of phytoplankton and zooplankton consists of polyunsaturated acids. Also, the published literature indicates that there is an enrichment of surface-active lipid materials (fatty acids and fatty alcohols) at the air-sea interface and that a high percentage of many varied unsaturated fatty acids are present in particulate matter from surface waters. Nevertheless, few data are available on the fatty acid composition of particulate matter, which is an important food source, directly and indirectly to fish and marine mammals. The fatty acid composition of open-ocean (North Atlantic) surface particulate matter was determined and the data were compared to those obtained from particulate matter in estuarine samples from Narragansett Bay, R.I.

The total fatty acids (free and esterified) in particulate matter from the open ocean ranged from about 4 to 26 μg. per liter. The particulate matter contained a high proportion of long-chain polyunsaturated acids. There was a low amount of iso and anteiso 15-carbon acids indicating little bacterial contamination of the particulate matter. The estuarine particulate matter contained only trace amounts of long-chain polyunsaturated acids and large amounts of branched chain acids.

[2 tables, 23 references] FTP

9.13 COMPARISON OF THE ASSIMILATION OF DIFFERENT DIETS BY PENAEUS SETIFERUS AND P. AZTECUS

Condrey, Richard E., James G. Gosselink, and Harry J. Bennett (Louisiana State University, Baton Rouge, LA 70803)
Fishery Bulletin 70, No. 4, 1281-1292 (Oct. 1972)

In Louisiana estuaries shrimp is seasonally one of the dominant organisms and commercially the most important one. Earlier work on shrimp gut contents seemed to indicate that the organism ingests the dominant materials in the sediments. In Lake Ponchartrain other workers found that 58% of the stomach contents of adult white shrimp was unidentifiable detritus. Little is known, however, about the ability of shrimp to digest different food sources. This study concerns the assimilation by the white shrimp, Penaeus setiferus, and the brown shrimp, P. aztecus, of the organic components of four different defined diets and a natural substrate.

Juvenile penaeid shrimp showed high and comparable assimilation efficiencies (80-85%) on a variety of plant and animal diets. In general assimilation efficiencies for proteins and lipids were consistently high; for carbohydrates, low. Organic assimilation per gram organic weight of white shrimp, Penaeus setiferus, proceeded at 3.7 mg hr^{-1} on an axenic diatom and 8.4 mg hr^{-1} on an artificial diet. The assimilation efficiency was lower for shrimp feeding on the algal mat coating Spartina alterniflora than on two components of the mat.

[2 figures, 8 tables, 23 references] (Partly extracted; partly modified)

9.12 POST-FERTILIZATION SYNTHESIS OF POLYADENYLIC ACID IN SEA URCHIN EMBRYOS

Slater, D. W., and Isabel Slater (Cell Biology Unit, Reproduction Research Branch, National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD 20014), and D. Gillespie
Nature 240, No. 5380, 333-337 (Dec. 8, 1972)

The authors used molecular hybridization of unlabeled cytoplasmic RNA with ^{3}H-poly(U) under stringent conditions to demonstrate that the inception of sea urchin embryogenesis is accompanied by more than a doubled net synthesis of polyadenylic acid [poly(A)]. Poly(A) is a species of RNA (ribonucleic acid) associated with metazoan genetic messages and certain viral RNAs. This work represents the first demonstration of the net synthesis of an RNA moiety in response to fertilization; further, the postfertilization synthesis of poly(A) is immune to tandem suppression of transcription and is significantly stimulated by the inhibition of protein synthesis. The results may possibly suggest that the controlled adenylation of preexisting genetic transcripts is modulated by a postfertilization transitional event other than the actual synthesis of the pertinent polymerase(s). It is interesting, the authors state, that this first demonstration of net synthesis of RNA following fertilization should implicate a species of nucleic acid believed to be regulatory rather than codogenic.
[5 figures, 2 tables, 58 references]

FTP

9.12 PROTEASE ACTIVITY ESTABLISHES THE BLOCK AGAINST POLYSPERMY IN SEA URCHIN EGGS

Vacquier, Victor D., Mia J. Tegner, and David Epel (Marine Biology Research Division, Scripps Institution of Oceanography, La Jolla, CA 92037)
Nature 240, No. 5380, 352-353 (Dec. 8, 1972)

Sea urchin eggs, on fertilization, release soluble macromolecules (referred to collectively as the fertilization product). In an earlier report, V. Vacquier, D. Epel, and L. Douglas [Nature 237, 34 (1972)] described a trypsinlike activity in the fertilization product. This trypsinlike activity released by sea urchin eggs at fertilization appears to have at least two functions. The first function involves the elevation of the vitelline layer away from the egg surface; the second, involves the detachment of supernumerary sperm from protease sensitive sperm attachment sites. Polyspermy is increased if the eggs are fertilized in the presence of inhibitors (for example, soybean trypsin) of the protease. Thus, this protease activity may prevent polyspermy by destroying the attachment sites of the nonfertilizing sperm.
[1 figure, 2 tables, 10 references]

FTP

9.14 (1.120) (1.0161) COMPARATIVE STUDY OF FOOD OF SKIPJACK AND YELLOWFIN TUNAS OFF THE COAST OF WEST AFRICA

Dragovich, Alexander, and Thomas Potthoff (National Marine Fisheries Service, NOAA, Southeast Fisheries Center, Miami Laboratory, 75 Virginia Beach Drive, Miami, FL 33149)
Fishery Bulletin 70, No. 4, 1087-1110 (Oct. 1972)

The principal surface tuna fishery in the tropical Atlantic Ocean is located off the coast of West Africa. One of the major tasks of the Southeast Fisheries Center, Miami Laboratory, has been the study of the biology and ecology of tunas and tunalike fishes in the tropical Atlantic Ocean. In view of the recognized importance of food as an ecological factor in the life history of tunas, one project of this investigation consisted of a study of the food and feeding habits of skipjack (Katsuwonus pelamis) and yellowfin (Thunnus albacares) tunas--the two predominant species in commercial catches in those waters.

[The authors] describe and compare the food of skipjack and yellwfin tunas and discuss the relative importance of different forage organisms. [They] compare [their] findings with those of other investigators working in the same general area. This information may be used to study the relationship between the distribution of food organisms and occurrence of tuna schools.

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9.15 MERCURY CONCENTRATIONS IN RECENT AND NINETY-YEAR-OLD BENTHOPELAGIC FISH

Barber, Richard T., Aiyasami Vijayakumar (Duke University Marine Laboratory, Beaufort, NC 28516), and Ford A. Cross (Atlantic Estuarine Fisheries Center, National Marine Fisheries Service, NOAA, Beaufort, NC 28516)
Science 178, No. 4061, 636-639 (Nov. 10, 1972)

Pollution of the oceans through agricultural and industrial activities is of growing concern. Interest has been especially aroused in regard to mercury (Hg) uptake by organisms in the oceans. The authors examined bottom dwelling fish tissue for mercury to determine the extent of this element in organisms of the ocean depths.

An otter trawl was used to collect a variety of large fish from a depth of 2,500 m. Two trawls were made southeast of Cape Hatteras at this depth for 2 hr. over a distance of 5.5 km. The catch consisted of five species of "benthopelagic" fish including: Aldrovandia machrochir, Antimora rostrata, Bathysaurus agassizi, Chalinura brevibarbis, and C. carapina. Axial muscle was removed in a block from the mid-dorsal region.

Samples of muscle were digested by a mixture of nitric and sulfuric acids followed by permanganate and persulfate oxidation, followed by stannous chloride reduction. Measurement of Hg was made on a flameless atomic absorption analyzer.

Mercury in A. macrochir muscle ranged between 0.03 and 0.08 p.p.m.; A. rostrata, 0.24 to 0.76 p.p.m.; B. agassizi, 0.36; C. brevibarbis, 0.38 to 0.42 p.p.m.; C. carapina, 0.36 p.p.m.; A. rostrata (taken in 1883), 0.50 p.p.m.; and A. macrochir

(over)

9.19 THE ENVIRONMENTAL MERCURY PROBLEM

D'Itri, Frank M. (Institute of Water Research, Michigan State University, East Lansing, MI 48823)
Published by the Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, OH 44128 (1972), 124 pp. Price not given.

This book provides an extensive background on mercury and its relation to the environment. The use of mercury from ancient times to the present is given. Background concentrations of mercury in nature exist in ores, rocks, soils, as well as glacial materials, air, and volcanic exhalations. Fossil fuels and natural waters also contain mercury. Twelve industries are listed which use mercury: Its use in electrical apparatus is first, 26.0%; chemical applications are second, 23.1%; agriculture, 6th place, 4.6%; general laboratory use, 2.6%; and paper and pulp, a low, 0.6%. Four and one-half pages are filled with the trade names and active mercury ingredients of mercury-containing pesticides. Analytical methods are given for determining mercury content in water, soil, air, sediment, and biological materials. Movement of mercury through the food chain is listed in detail: fish, meat, grains, flour, bread, beverages (beer), vegetables, baby food, plants, and animals. Biological methylation of mercury with a cycle of mercury interconversions in nature is shown. The effect of heat in increasing biological magnification of mercury in the environment is described. Planning for decontamination and restoration of polluted areas by binding mercury to inorganic and organic materials, the author suggests, should receive high priority. Epidemiology and toxicology of mercury poisoning with case histories is given.
[554 references] SW

9.15

(taken in 1886), 0.11 p.p.m. The feeding behavior and food eaten appears to be the same for all fish observed. The authors suggest that the differences of Hg concentration among the fish genera taken must be due to species specific metabolism.

The recently caught and museum specimen A. macrochir had Hg concentrations that were close to each other and lower than the other recently caught fish. The Antimora museum and freshly caught specimens had Hg concentrations that were close to each other. The authors believe the evidence indicates that there has not been a change in Hg concentration in these fish during the last century. Furthermore, they believe that Hg values exceeding 0.5 p.p.m. are to be expected in the larger individuals of certain species, and are not related to "anthropogenic" (man originated) inputs of Hg to the oceans.
[1 figure, 1 table, 18 references] SW

9.12 PROLACTIN AND OSMOREGULATION IN FISHES

Ensor, D. M., and J. N. Ball (Dept. of Zoology, The University, Liverpool, L69 3BX; and Dept. of Zoology, The University, Sheffield, S10 2TN, United Kingdom)
Federation Proceedings 31, No. 6, Part I, 1615-1623 (Nov.-Dec. 1972)

The authors review earlier work on endocrine control of osmoregulation in fishes and discuss ways in which prolactin affects osmoregulation in teleosts and the evidence for endogenous prolactin secretion and its physiological role in teleosts. Prolactin is a hormone controlling osmoregulation in hypotonic media; it is secreted at a high rate in fresh water but at a very low rate in sea water. Although little is known about prolactin in marine elasmobranchs, it appears to have a possible role in controlling water permeability. No physiological data are available concerning prolactin in other fishes.
[4 tables, 93 references] FTP

9.14 (1.120)(1.061)

Stomach contents of 711 skipjack tuna (Katsuwonus pelamis) and 132 yellowfin tuna (Thunnus albacares) captured in 1968 by live bait and trolling off the coast of West Africa were examined. A marked taxonomic similarity was noted between the organisms in the diets of the two tunas. Frequency of occurrence, displacement volume, and numbers of each food item identified are presented for each species of tuna. Fishes, mollusks, and crustaceans were the principal foods with fishes generally dominant. The most prominent fish families were Acanthuridae, Carangidae, Dactylopteridae, Gempylidae, Gonostomatidae, Lutjanidae, Mullidae, Priacanthidae, Scombridae, Serranidae, and Trichiuridae; mollusks were chiefly cephalopods (squids), and crustaceans consisted mostly of macrozooplankton. Juvenile tunas were present in the diet of both species of tunas.
[5 figures, 4 tables, 21 references, appendix]
(Partly extracted; partly modified)

9.14 EFFECTS OF DIETARY LIPIDS AND LIPID-TEMPERATURE INTERACTIONS ON GROWTH, FOOD CONVERSION, PERCENT LIPID AND FATTY ACID COMPOSITION OF CHANNEL CATFISH

Stickney, Robert R. (Florida State Univ., Tallahassee, Fla.)
Chemical Abstracts 77, No. 15, 99978z (Oct. 9, 1972)

9.12 RADIOACTIVITY IN JUVENILE COLUMBIA RIVER SALMON. (9.19) MODEL TO INTERPRET MOVEMENT AND FEEDING HABITS

Romberg, Gerald P., and William C. Renfro (Dep. Oceanography, Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98390q (Oct. 9, 1972)

9.19 RAPID METHOD FOR DETERMINING THE REVERSIBILITY OF FISH POISONINGS

Luk'yanenko, V. I. (Tsentr. Nauchno-Issled. Inst. Osetrovogo Rybn Khoz., Astrakhan, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57248f (Aug. 28, 1972)

9.16 PRELIMINARY EXAMINATION OF TWO ENVIRONMENTAL CONTROL METHODS, REDUCED SALINITY AND LIGHT DEPRIVATION, FOR THE TUNICATE BOTRYLLUS SCHLOSSERI IN AQUACULTURE SYSTEMS

Perschbacher, Peter W.
In Oceanography Field Practicum 1972, Technical Report No. 33, MICHU-SG-72-215, pp. 149-160 (Aug. 1972) (University of Michigan, Sea Grant Program)
Edward C. Monahan, and G. Thomas Kaye (Dept. of Meteorology and Oceanography, College of Engineering, University of Michigan) (compilers)

In an aquaculture project incoming sea water is filtered to prevent entry of fouling organisms with the exception of the colonial tunicate B. schlosseri. The organism is undesirable because of its rapid summer growth by asexual budding which may result in a mat of contiguous colonies over 1 ft. in diameter. This overgrowth adversely affects coastal oyster culture and aquaculture systems.

Experiments were performed to examine several environmental methods for control of the organism in aquaculture systems. Variations in salinity and temperature were used to determine the lethal level. Slides with five colonies on each were immersed in two groups of vessels containing 20, 15, 10, 5 ‰ salinities, and fresh water at 22° and 16.5° C., respectively. At intervals of 5, 15, 30, 60, and 90 min., a slide was removed from each vessel and returned to environmental salinity, (31 ‰). A count to determine mortality was made several days later. Mortality was determined by evidence of decomposition, a red-orange appearance of the organisms.

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9.16 (1.32) FRAZER LAKE SOCKEYE INVESTIGATIONS, 1970

Russell, Philip A. (Division of Commercial Fisheries, Anchorage, Alaska)
Information Leaflet No. 159, 83 pp. (Sept. 1972) (State of Alaska, Dept. of Fish and Game, Support Building, Juneau, AK 99801)

Frazer Lake, located on Kodiak Island, is 8 miles long and 1 mile wide. Drainage from the lake is via the Frazer River. Ten of the tributary streams entering Frazer Lake provide about 1 million sq. ft. of potential spawning area for sockeye salmon. A 30-ft. falls ½ mile below the lake outlet blocked migration into the lake.

From 1951 to 1956, about 2,600,000 green sockeye eggs were planted in the Frazer Lake system. The first progeny returned in 1956. After 1962, returning spawners entered the system through a fish pass around the falls. A total of 98,860 adults have used the fish pass as of 1970. The return of spawners has increased through the years. The escapement for 1970 was 7,331 fish greater, due to an increased return and improved fish passage, than any previous year.

The age composition of smolt in 1970, as determined by scale analysis combined with the aid of length frequency, was 0.3% age 3.0, 31.6% age 2.0, 68.1% age 1.0, and 0.02% age 0.0. Age 0.0 smolt averaged 113 mm. in length and 12 g.; age 1.0 smolt 149 mm. and 31 g.; age 2.0 smolt 180 mm. and 54 g.; and age 3.0 smolt 193 mm. and 64 g. Fresh-water survival rate from potential egg deposition to smolt is about 0.70%. Relatively good agreement between length frequency groupings and scale analysis age groups indicates age determinations were reasonably accurate.

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9.16 THE CAGE CULTURE OF SOME MARINE FISHES IN THE INTAKE AND DISCHARGE CANALS OF A STEAM-ELECTRIC GENERATING STATION, GALVESTON BAY, TEXAS

Marcello, Rocco Anthony, Jr., and R. Kirk Strawn (Dept. of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77840)
Texas A&M University Sea Grant Publication No. TAMU-SG-72-206, xxvi + 267 pp. (Sept 1972) (Texas A&M University, Sea Grant Program, College Station, TX 77840)

The demand for fishery products has been steadily increasing in the United States and around the world. Since the commercial fishing industry cannot meet this demand, fish farming has been advocated as a supplementary measure. Although fish farming has its merits, there are some limiting factors. The primary one is that some fish cannot be grown to marketable size in one growing season, therefore, they must be wintered. To protect against large mortalities due to low winter temperatures, utilization of thermal discharges from electric generating stations has been suggested. This study was undertaken to determine the feasibility of this suggestion.

Several species of marine fishes, croaker (Micropogon undulatus), pinfish (Lagodon rhomboides), pompano (Trachinotus carolinus), white mullet (Mugil curema), pigfish (Orthopristis chrysoptera), Gulf kingfish (Menticirrhus littoralis), silver perch (Bairdiella chrysura), spot (Leiostomus xanthurus), and black drum (Pogonias cromis), were placed in cages in the intake canal, and croaker, pinfish, and pompano were placed in cages in the discharge canal of a steam-electric generating station on Galveston Bay, Tex., for determination of survival, food conversion, length-weight relationship, condition, and growth. Approximately 25 fish were placed in each of 45 cages, 30 cages in the intake canal and 15 cages in the discharge canal. Survival, feeding, food conversion, length-weight relationship

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9.16 GROWTH AND FOOD CONVERSION OF RAINBOW TROUT REARED IN BRACKISH AND FRESH WATER

Murai, Takashi, and James W. Andrews (Skidaway Institute of Oceanography, 55 West Bluff Road, Savannah, GA 31406)
Fishery Bulletin 70, No. 4, 1293-1295 (Oct. 1972)

Although brackish water culture of rainbow trout (Salmo gairdneri Richardson) has been practiced in other countries for years, few attempts have been made to culture this euryhaline species in brackish water in the United States. This work was designed to study the growth, food conversion, and survival rates of rainbow trout reared from fingerling to market size in brackish and fresh water.

Six 1.8-m diameter ground fiber glass tanks with a water depth of 0.6 m were used as experimental culture tanks. Fresh water from a deep well (22° C) or brackish water (25-30 ‰) from the Skidaway River, Savannah, Ga., was pumped into each tank through flow control nozzles at a rate of 19 liters/min (1.3 hr/exchange). Water temperatures were not controlled. Four experimental tanks were stocked with rainbow trout averaging 60 g each at an initial density of 7.2 kg fish/m^3, and two were stocked at a density of 14.4 kg fish/m^3. Fish in two of the tanks containing 7.2 kg/m^3 and the tanks containing 14.4 kg/m^3 were acclimated to brackish water by gradually changing the fresh to brackish water ratio of incoming water. Each group was fed a commercial pelleted trout feed twice daily. The entire population of each tank was weighed and counted monthly. Temperatures, ammonia, salinity, and dissolved oxygen levels were determined biweekly. Ammonia levels were below 0.3 p.p.m. and oxygen concentrations were above 7.0 p.p.m. throughout the experimental period. After 16 weeks, the experiment was terminated.

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and condition, and growth records were maintained for all species being cultured. A record of the hydrological data at the culture sites was also maintained.

Each cage was 3 × 4 × 3 ft., constructed of 1 × 1/8-in. angle iron and 1/2 × 1-in. mesh galvanized welded wire (16 gauge), dip-treated to prevent corrosion, and had polystyrene flotation blocks attached lengthwise on two sides. A feeding ring 12 × 18 × 24 in. constructed of 1/8-in. mesh galvanized hardware cloth with top and bottom open was inserted in the top of each cage so that 20 in. of it extended into the cage interior.

All fish were fed pelleted Purina Trout Chow daily, six times per week: pompano at about 5% of their total weight in a cage, all other species at about 3% of their total weight in a cage. After placing food in the feeding ring, the cage was tapped several times to notify the fish of its presence. Croaker, pinfish, pompano, white mullet, spot, and black drum cultured in the intake canal had a survival rate of 70%. Survival in the discharge canal was extremely poor, with an almost complete mortality of croaker and pompano. The mortality was attributed to gas-bubble disease. Although only preliminary data were obtained, using heated discharge to extend the growing season of fish during periods of low-water temperature is promising and deserves further study. Food conversion efficiency was greatest in the croaker and less than acceptable in all other species studied. Generally speaking, the length-weight relationship for almost all species studied were greater than those for naturally occurring fish. In almost every case, cage-cultured fish were heavier per any given length.

Growth of all species of cultured fish was at least equal to, if not greater than, naturally occurring fish. Growth was slowed considerably during the winter months for the fish in the intake canal. The few surviving fish in the discharge canal (receiving the heated water) exhibited normal growth throughout the year.
[28 figures, 52 tables, 91 references, 38 appendix tables] Lee Thorson

The results showed that:

1. Rainbow trout were converted from fresh to 30‰ salinity in a period of 9 days and were reared to market size at this salinity.
2. Trout fingerlings averaging 60 g each were reared to 266 g in 21° C fresh water with a rapid individual growth rate and an acceptable survival and food conversion rate.
3. Survival and growth rates and food efficiencies were excellent for trout reared in brackish water at an average temperature of 13.5° C.

[2 figures, 1 table, 8 references] (Partly extracted; partly abstracted)

9.16 MIXED FEEDS FOR TROUT IN NET CAGES

Tiews, J., J. Gropp, H. Koops, and K. Tiews (Tierzuchtl. Fak., Univ. Muenchen, Munich, Germany)
Chemical Abstracts 77, No. 13, 86901u (Sept. 25, 1972)

Results of these tests showed that the lethal level at 22° C. is 30 min. in fresh water and 60 min. in water of 5 ‰ salinity. At 16.5° C., there was 100% mortality in fresh water in 30 min. and no mortality in water of 5 ‰ salinity. In tests at 6.5° C. in various salinities, no mortality was found in fresh water. Prolonged tests in water of 10 ‰, 15 ‰, and 20 ‰ salinity produced 10% mortality in 10 ‰ salinity at 36 hr. and no mortality after 1 week for organisms in 15 ‰ and 20 ‰ salinity. Organisms adapted to light deprivation and subjected to the same tests reacted in the same manner as organisms that were not deprived of light. The lethal levels for B. schlosseri at 22° and 16.5° C. in fresh water and 5 ‰ salinity are well within the tolerance limits of oysters and most bivalves. Oysters or other cultured bivalves infested with the organism can be flushed with fresh water at temperatures of 20° and over. Oysters will survive in fresh water for 3 days with zero mortality. Draining the pond or impoundment and refilling with fresh water would constitute flushing.
[3 tables, 13 references]
SW

Since 1956, the number of adult sockeye entering Frazer Lake has increased with a peak return of 24,081 in 1970. The majority of adults entering the Frazer system were age 2.2. An increase in sockeye spawner survival occurred in 1970 as a result of improved fish pass efficiency.

Temperature profiles taken at Frazer Lake from 1965-1968 and 1970 show similarities to river temperature data. The copepod (tiny crustaceans) concentration of the zooplankton in the lake system has remained fairly constant, while the populations of rotifers (microscopic wormlike animals) and cladocerans (tiny crustaceans) have been increasing since 1965.
SW

9.19 CLOSED WATER CIRCULATION IN USED PAPER-PROCESSING PAPER MANUFACTURE

Brecht, Walter, and Hans Lutz Dalpke (Inst. Papierfabr., Tech. Hochsch., Darmstadt Germany)
Chemical Abstracts 77, No. 24, 154168n (Dec. 11, 1972)

9.17 (9.3) THE PLIGHT OF OCEAN MAMMALS

Herrington, Alice (Friends of Animals, Inc.), and Lewis Regenstein (Committee on Humane Legislation, Inc., Washington, D.C.)
Environmental Affairs 1, No. 4, 792-825 (Mar. 1972)

The nature of the problem relative to the destruction of the ocean mammals (seals, sea otters, whales, and polar bears) are described and discussed. The authors believe that protective legislation for these ocean mammals must state three principles: (1) a total ban on the importation into the United States of all products, raw or finished, from any ocean mammal, (2) a ban on Americans' killing ocean mammals anywhere in the world, and (3) a mandate to the State Department to vigorously negotiate a truly international treaty for a halt to the slaughter of ocean mammals.
[161 footnotes]

FTP

9.19 (0.35) EFFECTS OF TRISODIUM NITRILOTRIACETATE ON CADMIUM AND METHYL MERCURY TOXICITY AND TERATOGENICITY IN RATS

Nolen, G. A. (Procter and Gamble Co., Miami Valley Laboratories, Cincinnati, OH 45239), E. V. Buehler, R. G. Geil, and E. I. Goldenthal
Toxicology and Applied Pharmacology 23, No. 2, 222-237 (Oct. 1972)

Trisodium nitrilotriacetate (Na_3NTA) has been proposed as a partial replacement for sodium tripolyphosphate in detergents (to reduce the phosphate levels in rivers and lakes). Earlier work has shown Na_3NTA to be as nontoxic as the phosphate builders and to be neither embryotoxic nor teratogenic, even at exaggerated levels, in rabbits and rats. However, certain researchers reported that Na_3NTA enhanced the teratogenicity and lethality of $CdCl_2$ in rats and mice when administered subcutaneously and of CH_3HgCl when administered orally. The present study examines the effects of various levels of either methyl mercury chloride or cadmium chloride and Na_3NTA (in several combinations) on pregnant rats and fetal development.

Groups of mated female rats were given doses of Na_3NTA alone or Na_3NTA with $CdCl_2$ or CH_3HgCl in their drinking water during organogenesis. Cadmium (as $CdCl_2$) was fed at levels of 0, 0.01, 1, and 4 mg./kg. Mercury (as CH_3HgCl) was fed at levels of 0, 0.02, 0.2, and 4 mg./kg. Na_3NTA was administered at 0, 0.1, or 20 mg./kg. at each level of metal fed.

Cadmium at the 0.01 and 1 mg./kg. levels had no effect on the dams; the 4 mg./kg. level reduced the weight gains of the animals. Cadmium at the 1 and 4

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9.19 (0.35) EFFECTS OF TRISODIUM NITRILOTRIACETATE, TRISODIUM CITRATE AND A TRISODIUM NITRILOTRIACETATE-FERRIC CHLORIDE MIXTURE ON CADMIUM AND METHYL MERCURY TOXICITY AND TERATOGENESIS IN RATS

Nolen, G. A., R. L. Bohne, and E. V. Buehler (Procter and Gamble Co., Miami Valley Laboratories, P.O. Box 39175, Cincinnati, OH 45239)
Toxicology and Applied Pharmacology 23, No. 2, 238-250 (Oct. 1972)

In another study, reported on pages 222-237 of the same issue of this journal, the effects of various levels of cadmium chloride or methyl mercury chloride and trisodium nitrilotriacetate (Na_3NTA) (in combination) on pregnant rats and fetal development were examined. It is known that Na_3NTA will bind to Fe^{3+} and other cations in preference to Cd or Hg. Therefore, the present study was carried out to determine the effects of the widely prevalent cation Fe^{3+} on the toxicity and teratogenicity of Hg- or Cd-Na_3NTA mixtures. Also, the effects of trisodium citrate dihydrate, a ubiquitous natural chelator, was compared with those of Na_3NTA on the induction of methyl-Hg or Cd toxicity and teratogenicity.

Groups of pregnant rats were fed 4 mg./kg. of either Cd (as $CdCl_2$) or Hg (as CH_3HgCl) with 20 mg./kg. of either Na_3NTA, or Na_3-citrate, or Na_3NTA plus 7 mg./kg. of $FeCl_3$ per day from days 6 to 15 of gestation. The compounds were administered in distilled and deionized drinking water.

The results of the study (and those of the previous study) showed that Na_3NTA had no effect on the maternal toxicity or teratogenicity of $CdCl_2$ or CH_3HgCl, even

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9.19 (1.93) MARINE TURTLE NESTING ON HUTCHINSON ISLAND, FLORIDA IN 1971

Gallagher, Robert M., Malcolm L. Hollinger, Robert M. Ingle, and Charles R. Futch
Special Scientific Report No. 37, Florida Department of Natural Resources, Marine Research Laboratory, St. Petersburg, Fla. (July 1972), 11 pp.

An 890-megawatt steam-generating nuclear power plant being built on Hutchinson Island, Fla., is expected to be operating in 1974. Baseline data were collected for comparison with conditions after the plant is placed in service. A part of the study was a survey of the nesting sea turtle populations on Hutchinson Island.

Earlier reports indicated that Hutchinson Island beaches are an important nesting area for the Atlantic loggerhead turtle, Caretta caretta caretta (Linnaeus), the Atlantic green turtle, Chelonia mydas mydas (L.), and the leatherback turtle, Dermochelys coriacea coriacea (L.).

This study was performed to estimate total nesting of loggerhead turtles and predation rates upon eggs. In addition, exact numbers of nesting green and leatherback turtles were determined.

Atlantic loggerhead turtle nesting was first noted May 7, peaked during the first week of July, and continued through September 10. A total of 1,420 nests were recorded in this period. Of the observed nests, 44% occurred during a 4-week period ending July 10. Raccoons destroyed 28% of the nests. Total egg production was estimated at 402,000. Seven tagged turtles built two nests each. Time intervals between nestings ranged from 14 to 55 days. The distance between nesting crawls ranged from 0.5 to 13.5 miles.

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9.19 MERCURY POLLUTION AND LAKE ERIE FISHES

Annett, C. S., M. P. Fadow, F. M. D'Itri, and M. E. Stephenson (Michigan State Univ., East Lansing, Mich.)
Chemical Abstracts 77, No. 7, 46896q (Aug. 14, 1972)

9.19 (0.35)

at exaggerated levels. The present study indicated further that the effects of trisodium citrate were not significantly different from those of Na_3NTA. The Fe^{3+} gave some protection against methyl-Hg induced teratogenicity, which the authors believe was not influenced by the presence of Na_3NTA. In conclusion, the results of this study confirm that Na_3NTA does not enhance the teratogenesis of cadmium or of methyl-Hg.

[7 tables, 9 references] FTP

9.17 REGULATED STREAM DISCHARGE FOR FISH AND OTHER AQUATIC RESOURCES -- AN ANNOTATED BIBLIOGRAPHY

Fraser, J. C. (Environment Protection Authority, Victoria, Australia)
FAO Fisheries Technical Paper No. 112, 103 pp. (Sept. 1972) (Food and Agriculture Organization of the United Nations, Rome, Italy) (Distribution restricted)

This bibliography is a list of abstracts and references of readily available literature relative to the problem area of how to establish or select adequate minimum flows in streams which have been brought under complete or partial control by dams or diversions. FTP

9.19 (1.93)

Twenty-two Atlantic green turtle nests were found on two sections of beach, between June 26 and August 30. An estimated 8 to 10 individuals produced about 2,948 eggs.

Six leatherback turtle nests were found from May 17 to June 30.

[4 figures, 2 tables, 12 references] SW

9.19 INVESTIGATIONS ON THE OCCURRENCE OF MERCURY IN TUNA
(1.12)

Pirati, D., et al.
Industria Conserve 47, No. 1, 11-15 (1972) (In Italian)
BFMIRA Abstracts 25, No. 12, Abstract No. 4373, 523 (Dec. 1972)

Data on the distribution of mercury in the organs of three tuna species (Yellowfin, Bigeye and Skipjack) and the relation between mercury content and body weight were obtained. C.C. Reprinted

9.19 REMOVAL OF MERCURY FROM INDUSTRIAL WASTES

Oehme, Christian, Hans Rudolf Brost, and Heiko Hoffmann (Farbenfabriken Bayer A.-G.) (pat.)
German Offen. (Patent) 2,110,057 (Sept. 7, 1972)
Chemical Abstracts 77, No. 24, 156143z (Dec. 11, 1972)

9.19 (0.35)

mg./kg. levels increased the number of defective fetuses; no significant embryotoxicity was produced. Mercury at the Na_3NTA produced no significant effect at any of the levels of cadmium. Mercury at the 0.02 and 0.2 mg./kg. levels had no effect on the dams; mercury at the 4 mg./kg. level reduced the weight gains of the animals. A significant number of abnormal fetuses increased as the level of Hg fed increased, but the presence of Na_3NTA produced no significant change.

The authors concluded that Na_3NTA did not enhance the toxicity or teratogenicity of $CdCl_2$ or CH_3HgCl.

[11 tables, 15 references] FTP

9.19 GROWTH OF CHLAMYDOMONAS IN A MEDIUM CONTAINING MERCURY

Ben-Bassat, David, Gedalia Shelef, Nachman Gruner, and Hillel I. Shuval (Hebrew University--Hadassah Medical School, Dept. of Medical Ecology, Environmental Health Laboratory, Jerusalem)
Nature 240, No. 5375, 43-44 (Nov. 3, 1972)

The behavior of the alga Chlamydomonas grown in a medium containing mercury was studied with a view to the removal of mercury from sewage and industrial wastes by algal treatment processes.

A sterile medium containing penicillin, acetate, citrate, and minerals was provided for growth of Chlamydomonas reinhardi y^{-1} with various concentrations of $HgCl_2$ or $^{203}HgCl_2$ (0 to 1.0 mg./l.). A mixture of air and 5% CO_2 was bubbled through the medium (sown at 80-100 cells/.001 ml., and it was exposed to continuous illumination.

Results of the tests indicated that raising the concentration of Hg from 0 to 1.0 mg./l. caused an increase in the lag period of algal growth. On a medium containing 2 mg. mercury per liter growth was completely retarded.

Tests were performed using a medium containing 0.2 mg. of $^{203}HgCl_2$/l. and a control medium containing 0.16 mg. of $^{203}HgCl_2$/l. with no algae. Cultures containing ^{203}Hg were found to behave similarly to nonradioactive Hg cultures. The mercury concentration of the whole culture (medium + cells) decreased 40% in the 8 days of the experiment as compared to a 5% decrease in the control. The change in concentration was essentially in the medium alone as only 2 to 2.5% of the

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9.19 MERCURY IN HARBOUR PORPOISES (PHOCOENA PHOCOENA) FROM THE BAY OF FUNDY REGION

Gaskin, D. E. (Dept. of Zoology, University of Guelph, Guelph, Ontario, Canada), K. Ishida, and R. Frank (Pesticide Residue Testing Laboratory, Ontario Dept. of Agriculture and Food, Guelph)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1644-1646 (Nov. 1972)

Earlier work has indicated high levels of organochlorine pesticides in harbor porpoises from the Bay of Fundy region. The present paper gives data on the mercury levels of the longissimus muscle and the liver of harbor porpoises from the Bay. Forty-one muscle and twenty liver samples were collected from harbor porpoises taken in the Bay of Fundy region during 1969 to 1971. The total mercury content of the tissues was determined.

The total mercury content of the muscle tissue ranged from 0.21 to 1.92 p.p.m. (avg. 0.75) in the males and from 0.26 to 2.58 p.p.m. (avg. 1.02) in the females. The total mercury content of the liver tissue was from 0.89 to 18.3 p.p.m. in the males and from 0.55 to 91.3 p.p.m. in the females. In the muscle (four samples were examined), the mercury was practically 100% methylated. In the liver (six samples were examined), from 7.4 to 41% of the mercury was methylated; the concentration of methylated mercury was lowest in the livers with the highest level of mercury. The mercury level of the tissues appeared to be higher in the larger (and presumably older) animals.
[2 figures, 10 references]

FTP

9.19 THE POLYCHLOROBIPHENYLS, THEIR OCCURRENCE AND SIGNIFICANCE. A REVIEW

Edwards, R. (H. J. Heinz Co., Ltd., Hayes Park, Hayes, Middlesex, England)
Chemistry and Industry, No. 47, 1340-1348 (Nov. 20, 1972)

This article is a review of the literature concerning the polychlorobiphenyl compounds dealing with their properties and use, occurrence in the environment, toxicology, and analysis; the significance of the findings is discussed.

PCBs were recognized as far back as 1881 and were in widespread industrial use by 1930. The PCBs are complex mixtures of various compounds and isomers. Biphenyls, terphenyls, naphthalenes, and mixtures of these compounds are chlorinated to varying degrees depending upon the use to which they will be put. They are marketed under such trade names as 'Arochlor,' 'Phenochlor,' and 'Clophen.' They range from liquids to crystalline materials or hard resins. They are stable in water, acid, or alkali, and have such thermal stability that they are used as fire retardants. They are used in paints, varnishes, inks, elastomers, adhesives, putty, and general fillers.

The significance of PCBs (and pesticides) to man and other organisms must be evaluated in the context of their sublethal effects on populations over long periods of time. These influences on the population relate to the reproductive processes (reduction of fertility, delays in breeding) and to teratogenic and carcinogenic effects on the parent and later generations. From such a viewpoint, LD_{50} tests are not relevant even over a long period. Although severe liver damage and death can result to mammals from high levels of PCBs, such levels are reached only in a few food chain heads and are not the normal levels found in man. However,

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9.19 (0.6) SURVEY OF FOOD INGREDIENT-DDT REACTIONS UNDER THERMAL PROCESSING CONDITIONS

Ralls, Jack W., and Antoni Cortes (Western Research Laboratory, National Canners Association, Berkeley, CA 94710)
Journal of Food Science 37, No. 5, 760-763 (Sept.-Oct. 1972)

Earlier work by various researchers has shown that when foods containing DDT residues are processed the DDT levels may be reduced and the DDT may be transformed in part to DDD or other transformation products. [DDT is 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane; DDD is 1,1-dichloro-2,2-bis-(chlorophenyl)ethane.] The present study was carried out to determine which food components are responsible for the transformation of DDT to other compounds during heat processing. This report gives the results of studies of the changes in aqueous solutions or suspensions of DDT during heating with vitamins, amino acids, peptides, casein, yeast nucleic acid, and diphosphopyridine nucleotide. The amino acids and peptides tested were arginine, lysine, histidine, cysteine hydrochloride, glutathione, and aspartylphenylalanine methyl ester. The water-soluble vitamins tested were thiamine hydrochloride, folic acid, riboflavin, choline chloride, niacin, ascorbic acid; other chemicals consisted of ferrous sulfate, DiNa EDTA, and hydrogen peroxide. A nine component mixture tested was composed of riboflavin, thiamine hydrochloride, folic acid, yeast nucleic acid, cysteine HCl, niacin, choline chloride, ascorbic acid, and glutathione. A 5-liter flask heated by a Glascol mantle was used for the thermal reactions. Two liters of water or phosphate buffer and the food ingredient(s) were added to the flask. Two ml. of an acetone solution of

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DDT appears to have a definite 'no effect' level, but PCBs apparently do not. Furthermore, we do not know exactly what compounds are responsible for the toxicity of PCBs, but they may involve the lower chlorinated compounds and probably the oxidation products in vivo and in vitro. Also, impurities in some commercial mixtures of the PCBs are toxic, and there is the possibility of synergistic effects. Multigeneration tests involving feeding levels of the order of 1 p.p.m. over a long period are difficult to carry out. Nevertheless, the need for such tests may be related to recent tests with DDT. Despite many years of study with DDT, it was only recently found that with the original parents (mice) dosed, carcinogenic effects occurred in later generations (the sixth). In the western coastal states of the United States, genetic changes in the fruit fly population resulted from DDT spraying programs in the area; also, the genetic changes were correlated with spreads by wind over long distances. PCBs are probably spread mostly by water, and they now appear all over the continental shelves fed by industrial effluents. It is clear, the author states, that with the ubiquitous presence of the PCBs, the effects of PCBs and associated compounds must be evaluated with great thoroughness. [8 tables, 70 references]

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9.19 (0.6)

radioactive DDT was added to the flask; the amount of DDT added corresponded to a level of 7.0 p.p.m. The reaction mixtures were heated for 2 hr. at 100° C. Thin-layer chromatography on alumina plates was used to resolve the mixtures into regions corresponding to R_f values for five known transformation products or analogs of DDT. The quantity of each product formed was related to the radioactivity of each plate region.

DDT is relatively stable in heated water or buffer solution (0.10 mol phosphate) at pH from 3 to 8 (DDT recoveries ranged from 98 to 100%); at pH 8.1 about 4% DDE [1,1-dichloro-2,2-bis-(p-chlorophenyl)ethene] was formed. The maximum reduction in DDT content of a suspension containing DDT and a single component was 10%, and it occurred with cysteine hydrochloride. The mixture containing DDT and nine other components showed a 20% reduction in DDT content.
[1 figure, 7 tables, 8 references]

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9.19 EFFECTS OF DIELDRIN-CONTAMINATED FOOD ON THE DEVELOPMENT OF LEPTODIUS FLORIDANUS LARVAE

Epifanio, C. E. (Dep. Zool., Duke Univ., Durham, N.C.)
Chemical Abstracts 77, No. 11, 71085g (Sept. 11, 1972)

9.19

total culture radioactivity appeared in the cells. Mercury decrease in the medium became slower in the course of the experiment. The amount of mercury per cell decreased 90% in the same amount of time. This decrease in Hg is probably the result of its loss from the system.

It was further found that the algal cells were able to recover from the growth lag induced by Hg. During the lag, Hg concentration fell from the initial 0.2 mg./l. to 0.17 mg./l. The loss of Hg was due to the presence of the cells and the loss was particularly active in the lag period. The authors suggest that the mercury changed into a volatile form through some biological process, which allowed it to leave the system. Simultaneously, the cell affinity (or cell permeability) for mercury was reduced.
[3 figures, 5 references]

Lee Thorson

9.19 POLYMERIC ADSORBENTS FOR HEAVY METALS

Oda, Nakaaki, Shozo Iwasa, Mitsuru Idohara, Yoshio Horie, Takeo Fukui, and Naomichi Takasaki (Japan Soda Co., Ltd.) (pat.)
German Offen. (Patent) 2,164,006 (July 13, 1972)
Chemical Abstracts 77, No. 18, 115337x (Oct. 30, 1972)

9.19 DISTRIBUTION OF MERCURY IN THE SEDIMENTS OF NEW HAVEN (CONN.) HARBOR

Applequist, M. D., A. Katz, and K. K. Turekian (Dept. of Geology and Geophysics, Yale University, New Haven, CT 06520)
Environmental Science & Technology 6, No. 13, 1123-1124 (Dec. 1972)

New Haven Harbor requires maintenance dredging and is subject to developmental dredging. The disposition of the dredge spoils, especially if they contain mercury and other metals, is of growing concern because of their possible toxic effects.

The authors assessed the distribution and levels of mercury in the sediments of New Haven Harbor and identified the probable sources of high concentrations where found. The results are indicated on a map of the harbor. The outfalls of the municipal sewage treatment are located on the map. Distribution of mercury in the sediments indicates that the primary supply was from these sewer outfalls. The different patterns of mercury distribution in the sediments around the outfalls was due to the local current systems.
[1 figure, 1 table, 5 references]

SW

9.19 MERCURY LEVELS IN TISSUES OF DUCKS COLLECTED IN SOUTH-CENTRAL NORTH DAKOTA

Swanson, G. A., G. L. Krapu, and H. K. Nelson (North Prairie Wildlif. Res. Cent., Jamestown, N.Dak.)
Chemical Abstracts 77, No. 11, 71038u (Sept. 11, 1972)

9.19 ENVIRONMENTAL TOXICOLOGY OF PESTICIDES

Matsumura, Fumio (Dept. of Entomology, University of Wisconsin, Madison, WI 53706), G. Mallory Boush, and Tomomasa Misato (Institute of Physical and Chemical Research, Wako-shi, Saitama, Japan) (editors)
Published by Academic Press, Inc., 111 Fifth Avenue, New York, NY 10003 (1972), i-xiv + 637 pp. Price not given.

The problems of environmental contamination by pesticides are the result of modern industrialization, urbanization, and highly developed agricultural practices. The editors compiled this book from a collection of papers presented at a seminar held in Oiso, Japan, October 1971, on the state of knowledge in the major pesticidal areas. It describes the efforts and approaches to solving or understanding these problems. The 48 contributors to the book are from Japan, the United States, Britain, and Canada. The major topics are as follows:

Part I. "Patterns of Pesticide Usage and Occurrence of Residues,"
Part II. "Mercury Transformation in the Environment,"
Part III. "Chlorinated Hydrocarbon Insecticides in the Environment,"
Part IV. "Fungicides, Herbicides, Organophosphates, and Carbamates,"
Part V. "Microbial Influence on Pesticide Degradation,"
Part VI. "Photodecomposition of Pesticides,"
Part VII. "Toxic Effect of Pesticide Residues on Wildlife," and
Part VIII. "Design of New Pesticides."

SW

9.2 TOWARD A SCIENCE OF SOCIAL FORECASTING

Meadows, Dennis L. (Thayer School of Engineering, Dartmouth College, Hanover, NH 03755)
Proceedings of the National Academy of Sciences of the United States of America 69, No. 12, 3828-3831 (Dec. 1972)

The United States is searching for improved policies of energy production, population growth, rural development, income distribution, foreign relations, and other important social areas. Decades will be required to develop such policies and to implement them, many more to assess their consequences, and still many more to process any revisions that may be necessary. Nevertheless, our political and economic institutions which make most social choices are structured to give little weight to the consequences of their actions more than a few years in the future. Most of our society's actions are based implicitly upon a concern for only the next 5 to 10 years. In this article, the author (1) explains the cause for concern over the lack of adquate long-range social forecasting methods, (2) indicates several minimum requirements for the new forecasting techniques we need, and (3) points to some of the unanswered questions about the mechanics and the ethics of the process through which formal models of social systems are used to influence the development of social policy.

The human socioeconomic system displays three dynamic characteristics that are also true for each individual nation. These are (1) Most physical attributes of the global system are characterized by exponential growth (population, mineral resource consumption, pollution generation, and food production are examples). (2) The earth's finite supply of resources and the finite capacity of the ecosystem

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9.2 EXTENDED RESULTS ON OPTIMAL INVESTMENT STRATEGIES IN SHRIMP FISHING

Sielken, R. L., Jr. (Texas A&M University), R. G. Thompson (Dept. of Quantitative Management Science, University of Houston), and R. R. Wilson (Economic Research Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce)
Report No. TAMU-SG-72-211, 27 pp. (Dec. 1972) (Texas A&M University, Sea Grant Program)

The first of three earlier reports [TAMU-SG-70-205 (Apr. 1970)] defined a deterministic (choices based on past performance) optimum control model of a shrimp fishing firm. This model was extended in a second report [TAMU-SG-70-218 (July 1970)] by incorporating, unknown but random, future shrimp catches and prices and a constraint that required solvency to be maintained. In a third report [TAMU-SG-71-101 (Dec. 1970)], the model was extended to require the purchase of integer numbers of vessels (as distinguished from fractional vessels) in relation to capital indivisibilities. This report considers the model described in the third report but extends the numerical examples to include alternative sizes of boats.

The model is the basis of a method of obtaining optimal investment strategies for shrimp fishermen. Parameters and variables which characterize the business environment in which the shrimp fishing firm is operating, such as indebtedness and price of shrimp, are given values in equations which can be solved by any of the commercial mixed integer programming computer programs.

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9.2 (0.6) BALANCE COST, TIMING TO REDUCE RISK OF NEW PRODUCT FAILURE

Rosenfeld, Samuel L. (New Products, Chesebrough-Ponds Inc., Greenwich, Conn.)
Food Product Development 6, No. 8, 31 (Dec.-Jan. 1973)

This article was adapted from a presentation by the author before the 20th Annual Marketing Conference, The Conference Board, New York, October 11, 1972. When dealing with the marketing of new consumer packaged goods, gaining time, momentum, and initiative over competition can be more significant than minimizing money risks. This fact should be kept in mind when balancing cost against gaining increased certainty. The time and cost involved in the evolution of a new product increases in progressive steps as shown in the following table:

Step	Money expended	Elapsed time
	$	Months
Screening	<1,000	<1
Evaluation	<10,000	1 to 3
Development	<100,000	3 to 18, or longer
Marketing	<100,000	6 to 12

The screening phase should involve little cost and risk. Evaluation involves development of a prototype, and the amount of time and money needed is not great. The development and marketing phases require substantially greater expenditures of time and money; the marketing phase involves the greatest risk. The table that follows shows various alternatives for decreasing the risk of new product failures.

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9.2

Three numerical examples are given to illustrate how a shrimp fisherman having a given amount of physical and money capital can use the model to obtain guide lines for investment and financial decision-making. The authors believe that computer costs to an individual seeking such guide lines should generally be less than $25 per year.
[8 tables, 3 references] SW

9.2 (0.6)

Item	Cost	Advantage or opportunity involved	Problems involved
	$		
Computer simulation	>10,000	Include many variables, check many alternatives	Missing answers to some steps below
Market simulation	20,000 to 40,000	Post trial useup and repeat rate	Unreality of "laboratory" marketing
Controlled test market	50,000 to 75,000	Saves selling lead time. Sales force effort unneeded	No sales force and distribution experience
"Mini" market (less than 1% US)	>100,000	Greater realism. Getting selling experience	Media and demographic unreality
Test market (1 to 10% US)	>200,000	Test variables more confidently	Still some media and demographic unreality
Regional introduction (Over 10% US)	>500,000	Preemptive	Regional peculiarities
National introduction[1]	>1,000,000	No lost time	High cost risk

[1] Involves full competitive exposure.

9.2 COST, TIME, AND PESTICIDE SAFETY (9.19)

Johnson, Julius E., and Etcyl H. Blair (Dow Chemical Co., Midland, MI 48640) Chemical Technology (CHEMTECH) 2, No. 11, 666-669 (Nov. 1972)

The authors discuss examples of how research and development (R&D) efficiency, time, and cost are all associated in the successful commercialization of a new agricultural pesticide. The cost of developing a new agricultural chemical in 1956 was $1,196,000; by 1964, the cost more than doubled; and by 1969, the cost tripled. These values do not reflect costs of pilot plants, process development, and other activities such as waste control and environmental factors. Today, one new pesticide emerges for every 10,000 compounds tested; the time from discovery to market is 8 to 10 years; and the cost is in excess of 10 million dollars. Figures given in the report depict pesticide research and development costs, safety evaluation--minimum registration requirements, expenditure program--eight typical R&D projects, and projected technical manpower for safety R&D in 1970 for agricultural chemicals.
[8 figures] FTP

9.19 THE EFFECTS OF SUBLETHAL CONCENTRATIONS OF WHOLE BLEACHED KRAFTMILL EFFLUENT ON THE GROWTH AND FOOD CONVERSION EFFICIENCY OF UNDERYEARLING SOCKEYE SALMON (ONCORHYNCHUS NERKA)

Webb, P. W., and J. R. Brett (Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 11, 1555-1563 (Nov. 1972)

The changes in growth rate and gross conversion efficiency were determined for underyearling sockeye salmon during and after exposure of the fish to full bleached kraftmill effluent (BKE). Groups of sockeye salmon were exposed for 56 days to 0, 1.0, 2.5, 10, and 25% of BKE (v/v). For these tests, a fresh 24-hr. composite of the effluent at pH 6.8 was used daily (after filtering). Growth of the fish was examined for an additional 56 days after their exposure to BKE. Sixty fish per tank were used; the temperature was held at 15° C.; and the dissolved oxygen was maintained between 90 and 100% air saturation.

The growth rate and conversion efficiency of the fish were not affected at the 0.1% and 2.5% BKE levels. At the 10% BKE level, reduced growth rate and conversion efficiency were not statistically significant from the controls but were considered to be important biologically in estimating threshold response levels. At the 25% BKE levels, there were statistically significant reductions in growth rate and conversion efficiency. The fish did not show recovery in retarded growth after exposure to BKE. Exposure to BKE had no effect on the condition of the fish. The EC50 (mean effective concentration above which growth or conversion would be reduced) of the bleached kraftmill effluent was about 3.7% (v/v).
[5 figures, 1 table, 23 references] FTP

9.2

to absorb material emissions place some limits to material growth. (3) A long delay exists, typically, in the effective response of society to any problem associated with material and population growth. These three characteristics of social systems have serious implications and are sufficient to introduce a pronounced tendency toward system instability.

Three possible ways to decrease the instability of our growing economic system are (1) Raise the effective limits to population and economic growth through technologies that allow more efficient use of resources or create less harmful impact on the environment. (2) Decrease the rate of physical growth through deliberate social and economic changes. (3) Reduce the length of system delays. Many social delays could be avoided if policies could be based on anticipation of social needs, rather than on responses to them. Our policies do have important, long-term implications for our social, economic, and ecological system, and we should assign a high priority to developing the appropriate forecasting technology.

Any new social forecasting method must have at least four features: First, it must be able to integrate into one conceptual framework information that ranges in precision from intuitive perceptions to controlled measurements of physical systems. Second, the analytical frameworks should provide a neutral vocabulary that permits professionals from many different fields to cooperate directly in pooling their knowledge. Third, a philosophy of system structure is required that acknowledges the complexity, the nonlinearities, the delays, and the tenuous casual relationships that determine the behaviour of real-world systems. Fourth, a new theory of inference and a set of formal techniques are needed that will permit analysts to assess the confidence that may be assigned to conclusions derived from complex, nonlinear, underidentified, simulation models.
[7 references] FTP

9.2 (1.0117) LOUISIANA COMMERCIAL FISHERIES

Jones, Lamar B., and G. Randolph Rice (Dept. of Economics, Louisiana State University, Baton Rouge, LA 70803)
In An Economic Base Study of Coastal Louisiana, Chapter 8, pp. 67-81 (1972), Publication No. LSU-SG-72-02. (Center for Wetland Resources, Louisiana State College, Baton Rouge, LA 70803)

The Louisiana commercial fishing industry led all 50 states in volume of catch, in 1968, 1969, and 1970, and it ranked third in value of catch in 1969. These values are a culmination of growth of the menhaden and shrimp industries. Louisiana accounted for 55% of the U.S. menhaden catch, and 27% of the U.S. shrimp catch.

Exports of U.S. fishery products increased from $36.8 million to $104.5 million in 1969. A substantial part of the increase was attributable to Louisiana brown shrimp production and oil from menhaden processing.

The oyster catch is the third most valuable fishery in the state. In 1969, the oyster landings total was 9.2 million pounds valued at $4 million. These figures are substantially reduced from 1968 catches; heavy damage in August 1969 by Hurricane Camille is responsible in part for the reduced oyster landings and values.

The state's commercial fishing industry employed 12,529 fishermen (the second highest number in the nation), and 5,664 shore workers in 1967. Louisiana had 1,698 large vessels (5 net tons and over) and ranked fourth in total number of vessels in the United States. Most of these were in the 300 to 399 horsepower

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9.3 (3.12) RECENT PROGRESS IN THE CONSIDERATION OF FLAVORING INGREDIENTS UNDER THE FOOD ADDITIVES AMENDMENT. 6. GRAS SUBSTANCES

Oser, Bernard L. (Food and Drug Research Laboratories, Inc., Maurice Ave., at 58th St., Maspeth, NY 11378), and R. A. Ford (Dept. of Chemistry, Montgomery College, Takoma Park, MD 20012)
Food Technology 27, No. 1, 64-67 (Jan. 1973)

This paper reports the latest results of evaluations of GRAS (Generally Recognized as Safe) status of 65 substances.
[1 table]

FTP

9.6 NEW JOURNAL ANNOUNCEMENT

Crane, Russak & Co. Inc. (Publisher), 52 Vanderbilt Ave., New York, NY 10017

The publisher announced the beginning of publication of two new journals, as quarterlies, early in 1973. The first, Ocean Development and International Law Journal, will deal with the varied matters bearing on the international aspects of ocean regulation, ocean affairs, and all forms of ocean utilization having international interest. The second, Coastal Zone Management Journal, will be concerned with the social, political, technical, and legal aspects of coastal zone management in North America. The price of a yearly subscription for 1973 for each of the journals is $26.00, postpaid. The four quarterly issues of each journal are expected to total about 400 pages.

FTP

9.7 CITATION ANALYSIS AS A TOOL IN JOURNAL EVALUATION

Garfield, Eugene (Institute for Scientific Information, Philadelphia, PA 19106)
Science 178, No. 4060, 471-479 (Nov. 3, 1972)

Little is understood, as a communication system, about the large array of journals that play a dominant role in the exchange of scientific information. The frequency of citation can reflect the value of a journal and the use made of it. The author presents results of an application of citation analysis.

The results show that there is a predominance of a small group of journals in the citation network. A combination of the literature of individual disciplines and specialties produces a multidisciplinary core for all science comprising no more than 1,000 journals. This essential core could be made up of as few as 500 journals if, for example, an attempt is made to satisfy the needs of libraries in developing countries.

Citation analysis is useful in several areas. It is of potential value in the management of library journal collections. It can be used by individual scientists in selecting journals to read and keep as well as for compiling reference and reading lists. It can be used by editors and editorial boards as useful indicators of a journal's performance in the extent of self-citation, the number of times cited each year, and the distribution of citations among citing journals within and outside the specialty literature. An important application for citation analysis is in studies of science policy and research evaluation.
[8 figures, about 55 references]

FTP

9.3 (9.19) U.N. GENERAL ASSEMBLY ESTABLISHES MACHINERY FOR INTERNATIONAL ENVIRONMENTAL COOPERATION

McGee, Gale W. (U.S. Representative to the United Nations General Assembly)
Department of State Bulletin 68, No. 1751, 53-59 (Jan. 15, 1973)

This report consists of a statement presented by Senator Gale W. McGee in Committee II (Economic and Financial) of the U.N. General Assembly on Oct. 20, 1972, on international environmental cooperation and the texts of three resolutions adopted by the U.N. General Assembly on Dec. 15, 1972. The three resolutions are: G.A.R. 2994, United Nations Conference on the Human Environment; G.A.R. 2995, Cooperation Between States in the Field of the Human Environment; and G.A.R. 2997, Institutional and Financial Arrangements for International Environmental Cooperation. [7 footnotes] FTP

9.7 FOOD SCIENCE COURSES FOR NON-FOOD SCIENTISTS

Morse, R. E. (Dept. of Food Science, College of Agriculture and Environmental Science, Rutgers--the State University, New Brunswick, NJ 08903)
Food Technology 27, No. 1, 58-60 (Jan. 1973)

Courses in food science for nonfood science majors are briefly described. Twenty-two universities giving such courses are listed, and typical course outlines in five universities are given. The course outline for one university consisted of:

Introduction;
Man's food and history;
Man's proper foods;
Man's improper foods;
Toxicity;
Toxicity and U.S. laws;
Protein foods;
Fat foods;
Carbohydrate foods;
Free discussion;
Vitamins and minerals;
Water;
Food preservation;
Food microbiology;
Food storage;
Food spoilage;
Food canning;
Food drying;
Food dehydration;
Food freezing;
Free discussion;
World population;
Food acceptance;
Food from land;
Food from sea;
Solutions to feeding the world; and
Summary and discussion.

[2 tables] FTP

9.2 (1.0117)

range; all but a fraction were used in the shrimp, menhaden, and oyster fisheries. The fleet also employed 6,133 smaller boats: the shrimp industry used 3,765; the remainder were used in the crab, oyster, menhaden, catfish, and crawfish industries.

More plants producing canned and industrial fishery products are located in Louisiana than in the other seven South Atlantic and Gulf states. In 1972, 35 firms were listed as dealing in fresh or frozen packaged seafoods, 27 in canned and cured seafoods, and 6 were listed in animal and marine fats and oils. Most of the canning activity involved shrimp, and in 1970 the value of production was $26.5 million. The large-scale industrial fishery is due to the substantial menhaden catch. Louisiana had 30 plants in 1970 engaged in industrial fishery production with a value of $30.1 million: 30% of the national total.

The state's shrimp industry employed 8,875 fishermen in 1967: 80% of all fishermen in the state. The otter trawl was the method used for harvesting 90% of the shrimp taken. The heaviest landings of shrimp are normally from May to November, but shrimping activity is year-round.

The fishing industry in Louisiana is a vital component of the national fishing industry and of the Louisiana economy.

[2 figures, 12 tables, 61 references] SW

9.6 (9.11) EXPLORING THE OCEAN WORLD

Idyll, C. P. (editor)
Published by Thomas Y. Crowell Company, New York (1972), i-viii + 296 pp. Price not given.

In this book the concept of oceanography is divided into the several diverse sciences which it comprises. There are 11 chapters in the book, each written by an expert on the subject, and his professional affiliation is identified. The chapters are as follows:

"The Science of the Sea," p. 2;
"The Underwater Landscape," p. 22;
"Biology of the Sea," p. 42;
"Physics of the Sea," p. 62;
"Chemistry of the Sea," p. 98;
"Food From the Sea," p. 130;
"Farming the Sea," p. 148;
"Mineral Resources and Power," p. 164;
"Underwater Archaeology," p. 196;
"Marine Ecology and Pollution," p. 232; and
"Man Beneath the Sea," p. 248.

Historical events associated with oceanography are listed, plus a substantial bibliography, and an index. The book is profusely illustrated with photographs, drawings, and maps. SW

9.19 CAPACITY OF MARINE PHYTOPLANKTON FOR ACCUMULATING A CHLORINATED BIPHENYL

Van Leeuwen, B. L. J. (Netherlands)
Chemical Abstracts 77, No. 15, 97203u (Oct. 9, 1972)

9.19 MERCURY DETERMINATION IN BIOLOGICAL MATERIALS (7.42) WITH THE AID OF A MVCM [MERCURY VAPOR CONCENTRATION METER] APPARATUS

Opalka, Stefan, and Ewa Mizikowska (Osrodek Badaw. Kolejowej Sluzby Zdrowia, Warsaw, Poland)
Chemical Abstracts 77, No. 11, 70958g (Sept. 11, 1972)

9.19 ASSAY OF MERCURY IN FISH (7.42)

Schulert, Arthur, Abid Zeind, James Davis, and D. Gordon Nicholson (Environ. Sci. and Eng. Corp., Nashville, Tenn.)
Chemical Abstracts 77, No. 11, 70952a (Sept. 11, 1972)

9.19 PREVENTION OF OFFENSIVE ODOR FROM FISH PROCESSING PLANTS. (6.135) VII. EFFECT OF ELECTROLYSIS OF SCRUBBED WATER ON REDUCTION (0.8) OF OFFENSIVE ODOR

Motohiro, Terushige, and Noboru Kimura (Japan)
Chemical Abstracts 77, No. 22, 143529e (Nov. 27, 1972)

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